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Railway Mechanical Engineer

March 1947

MORE THAN
80,000
CARS
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WITH...

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Cast Steel
HOPPER
FRAMES

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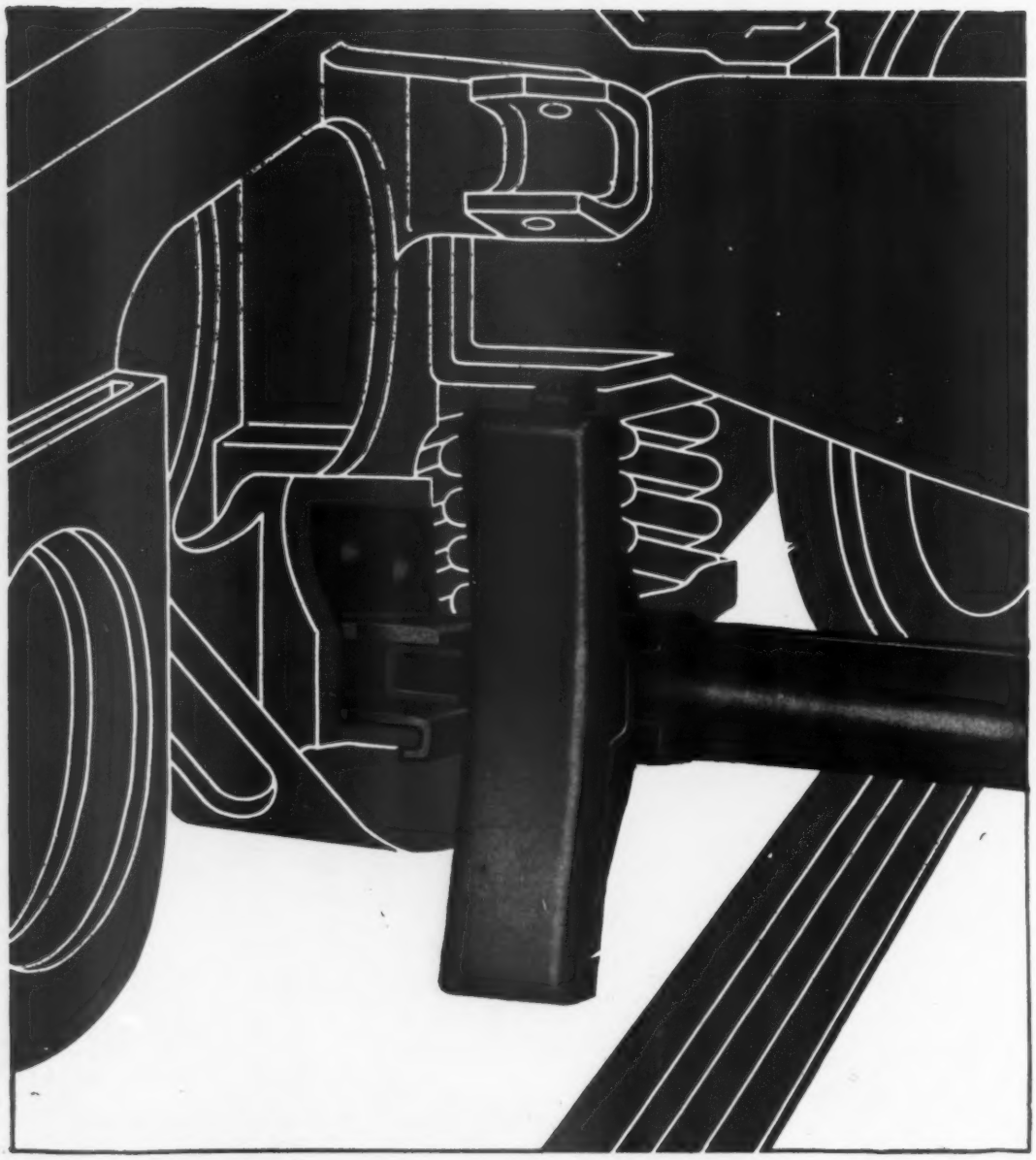

35%...

OF ALL NEW FREIGHT CARS ORDERED FOR DOMESTIC SERVICE IN 1946 WILL BE EQUIPPED WITH UNIT TRUCKS.

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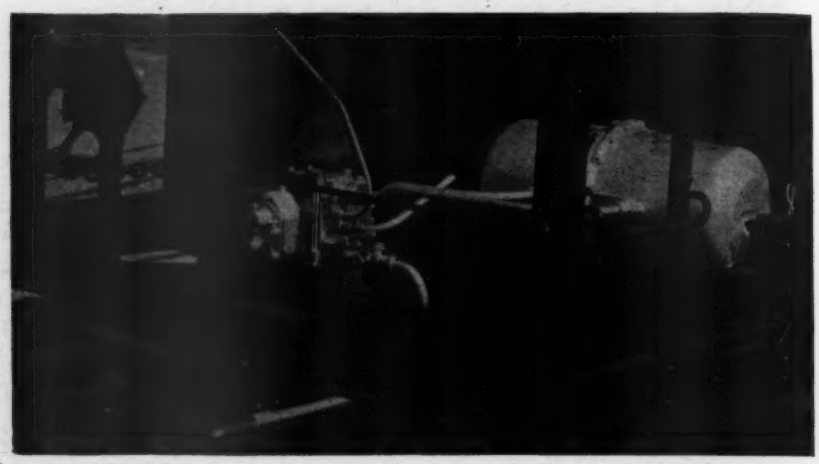
To keep equipment availability high— use BYERS WROUGHT IRON in the "hot spots"



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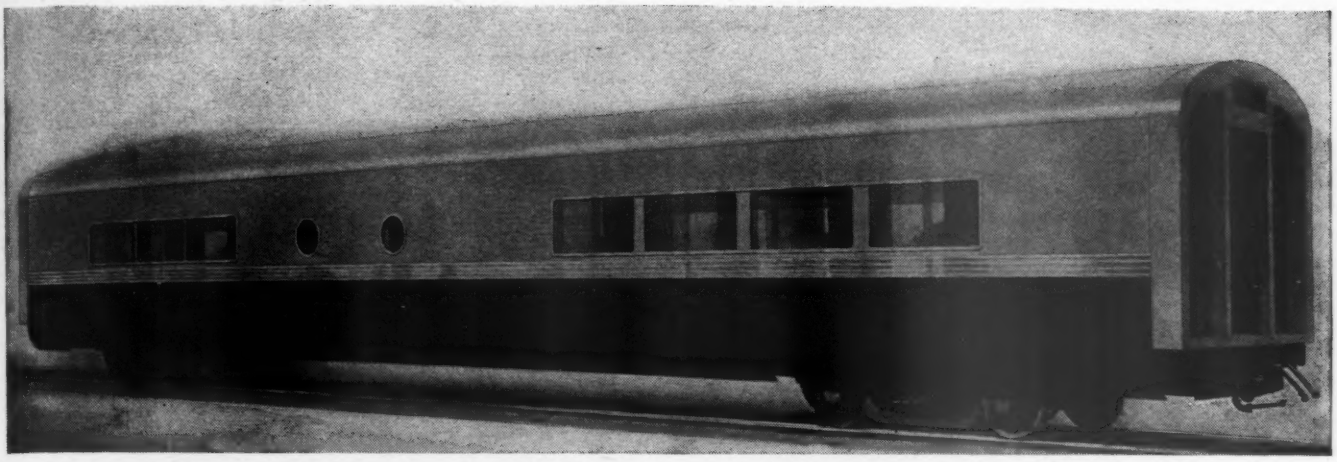


Exterior perspective of electronic diner (American Car and Foundry design)

The Changing Passenger Car*

By E. D. Campbell†

What the railroads and builders are doing to meet the challenge of competition and some predictions of the new things to come

THE railroads face the biggest passenger business of their history. They will need approximately 15,000 passenger-train cars.

During the past year, there were more than 3,000 passenger-train cars ordered by the American railroads. Luxury of appointments and the last word in modern interior facilities, as well as lightweight superstructures and sound-proofed trucks will characterize these passenger cars.

Structures

In achieving light weight, and because of the fact that passenger comfort demands more and more in the way of electrical and air-conditioning equipment, (thus adding to the weight), most of the new cars employ the use of materials that combine strength with physical characteristics above that of mild steel of the same section.

These materials are low-alloy high-tensile steels, stainless steels and aluminum alloys.

A breakdown of component parts in a passenger-train car shows that the structural shell accounts for approximately 30 per cent of the total weight, and the truck 32 per cent. The remaining 38 per cent consists of interior furnishings, seating, heating, lighting, air conditioning, batteries, body brake equipment and power supply.

Experience in service and analysis of the structure's behavior in wrecks demonstrate that all possess a reasonable safety factor.

The history of railroad accidents, particularly of passenger trains, discloses that most of them are due not to defective equipment, but to the personnel or human element. Some day, perhaps not too far distant, the operation of trains will be completely automatic. Controls will be governed by electronic equipment. The engineman at the throttle, will not even start the train, much less stop it. If anything goes wrong it will be stopped automatically, eliminating the human equation. A passenger-train accident will be a thing of the past and so rare, that it will be in the same category as the horse and buggy is to the modern auto.

In that age, passenger-train cars will be of a different design structurally. We will, perhaps, follow airplane construction. Design based on lightweight materials, such as aluminum alloys, magnesium, plastics, etc.

Looking ahead, we have designs of this nature using aluminum alloys. None has been built as yet. The weight of this structure per passenger is roughly 25 per cent of the weight of the present conventional alloy-steel car construction.

Exterior appearance is largely a matter of personal

* Abstract of a paper presented at the Meeting of the Transportation Division, American Institute of Electrical Engineers, February 6, 1947, New York, N. Y.

† Vice president in charge of engineering, American Car and Foundry Company.

American Car and Foundry design

High-speed double-end inter-city train

taste. From this standpoint the new cars will be of three types: (1) shiny unpainted; (2) painted, and (3) a combination of shiny and painted.

Stainless steel in fluted sections is well adapted to the shiny unpainted exterior and may be applied on framing of low-alloy high-tensile steel, stainless steel, or aluminum.

American Car and Foundry design

Interior of Slumberliner—Dayflector sash has louvers in upper portion; continuous fluorescent light has new location, close to reading plane—Solid baggage rack, which serves as a diffusing reflector for light, has slotted front for easy cleaning

The surface of stainless, however, is not well adapted to the application of paint coatings. A similar shiny unpainted fluted appearance will be accomplished on a number of the cars of aluminum construction by the use of extruded anodized aluminum mouldings.

For painted exteriors, low-alloy high-tensile steel and aluminum construction are best adapted. With spot-welded attachment of side sheets of low-alloy high-tensile steel the sides will be perfectly smooth without exposed rivet heads or other projections, which feature makes for easy cleaning and minimum accumulation of dirt.

Coaches

Of the cars on order, coaches considerably outnumber other types. These coaches will be equipped with conveniences to suit the most advanced standards of modern passenger travel. Comfortable reclining seats deeply cushioned and upholstered in soft sponge-rubber which allows one's body to be stretched out in a relaxed position without annoying his neighbors either in front, back or seated beside him. These chairs may also be revolved to face the broad double-glazed non-fogging window for a clear unrestricted view of the countryside, or turned about to face neighboring passengers. The lounge compartments will be larger and will contain every modern toilet facility for the journey. Deep divans and roomy chairs, large mirrors, dressing tables—all are found in these lounges.

Fluorescent lighting will be featured, placed directly over the center of each seat in the bag racks. The latest type of electric water coolers will be provided, also air conditioning throughout, insulation against heat, cold and noise, thus shutting out virtually all operating noises.

These are some of the provisions which have been made in the design of these coaches to make the traveler's journey cheerful and comfortable.

Luxury Cars

In the luxury cars such as lounge, bar, tavern, observation, buffet, cafe and dining cars, we will see striking examples of the ultimate in decorative features, soft pastel shades, varied in each car, colorful blending of drapes, chair fabrics, carpets and window curtains and in new facilities such as private rooms, cocktail lounges, snack bars, lunch counters, motion pictures and even space for dancing and nursery playrooms.

Sleeping Cars

Approximately one-third of the 3,000 cars on order are sleeping cars. Of this portion, single-occupancy rooms or roomettes take preference over bedroom cars. We shall see considerable improvement in sleeping accommodations. Single-occupancy room cars of the pre-war design have accommodations for 18 passengers. Present designs accommodate 21 passengers with no change in size of rooms. This has been accomplished by relocation of wardrobe, folding washbasin and shelf space. Appointments such as ash receivers, toilet-paper holders, berth operating mechanism and other hardware in general, have been refined. Double bedrooms have been designed with private enclosed toilet facilities. The upper berths in these bedrooms disappear into the ceiling thus giving the room a more spacious appearance.

Improved heating and air conditioning control will add to passenger comfort. Fluorescent lighting will also be featured in these room cars. Even the porter has been given consideration in that practically every sleeping

car will have a folding berth in one end of the car for his use.

Radio Equipment

Several railroads have installed very high-frequency radio equipment on their through-freight trains for end-to-end radio communication between the engineman in the locomotive and the conductor in the caboose.

Also low-frequency induction radio is being installed on the cabooses for direct communication with wayside stations. These two systems are entirely independent of each other.

The primary reason for the installation of these radio communication facilities is to speed up the handling of freight traffic, help eliminate delays and at the same time provide an added factor of safety.

I mention this because we shall see this type of equipment installed in passenger cars. As a matter of fact, several railroads are specifying installations of radio speakers in each bedroom so that passengers may listen to radio programs at the flip of a switch, or special announcements can be made by the conductor on the train through these same speakers. In the not-too-distant future we may be able to pick up a phone in our private room on a train and speak to relatives or friends as we pass through or near the cities in which they reside.

Air Conditioning

Modern passenger cars are heated almost universally by finned-copper floor-mounted steam-radiation systems supplied from the locomotive. Electric power required is furnished either by axle-driven or gas-engine-driven d. c. generators in conjunction with storage batteries of sufficient capacity to carry electrical loads for a reasonable time. Air conditioning is provided by d. c. electro-mechanical refrigerant compressors, by steam-jet systems, or by gas-engine-driven refrigerant compressors. Cooling capacity is usually 6 to 8 tons.

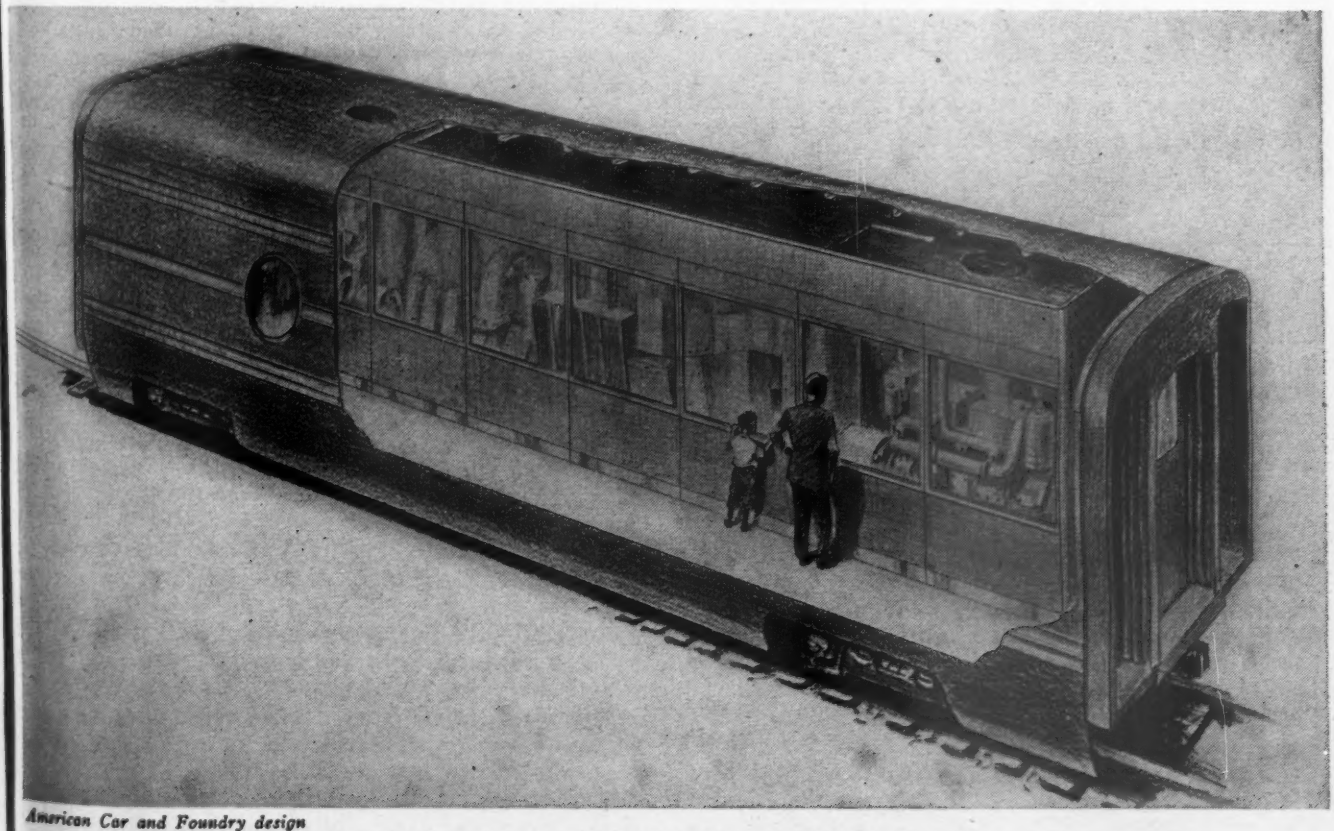
Cars equipped with either one of these systems utilize direct current power supply of 32, 64, or 110 volts potential. A motor-alternator or other conversion unit is usually provided to furnish alternating current for serving fluorescent lighting, utility outlets and other devices.

A reduction in weight of approximately 2,500 lb. has been accomplished by operating car electrical equipment from a source of relatively high voltage alternating current carried on the car. Such a car recently was placed in service in this country. Three-phase 220-volt, 60-cycle a. c. power is supplied by a Diesel-engine-driven 30-kva. generator mounted in the body. The engine generator is mounted on slide rails, and may be removed as a unit for servicing. Cooling capacity of from 8 to 9 tons is furnished by an air-conditioning unit powered by hermetically-sealed a.c. refrigerant compressors. The entire cooling assembly may be removed from the car without breaking any refrigerant lines thus it can be serviced during the winter months.

The car is heated normally by utilizing the heat lost to the Diesel-engine cooling system supplemented by electric strip heaters mounted near the car floor and in the fresh-air ductwork.

A centrifugal air cleaner removes much of the dirt present in the 800 cu. ft. of fresh air drawn into the car ventilation. A Precipitron, further cleans the air and removes tobacco smoke particles from recirculated car air. Generation of alternating current power on the car makes possible the use of commercially developed a. c. apparatus, including an a. c. motor cooler. The use of 220-volt, a.c. current in power circuits effects a substantial reduction in the weight of wire, cable and conduit.

Still further reduction in the weight of passenger-car electrical and heating equipment may be achieved when power is generated at the head end of the train. Such a system requires train-lining of power and control circuits of all cars in the train.



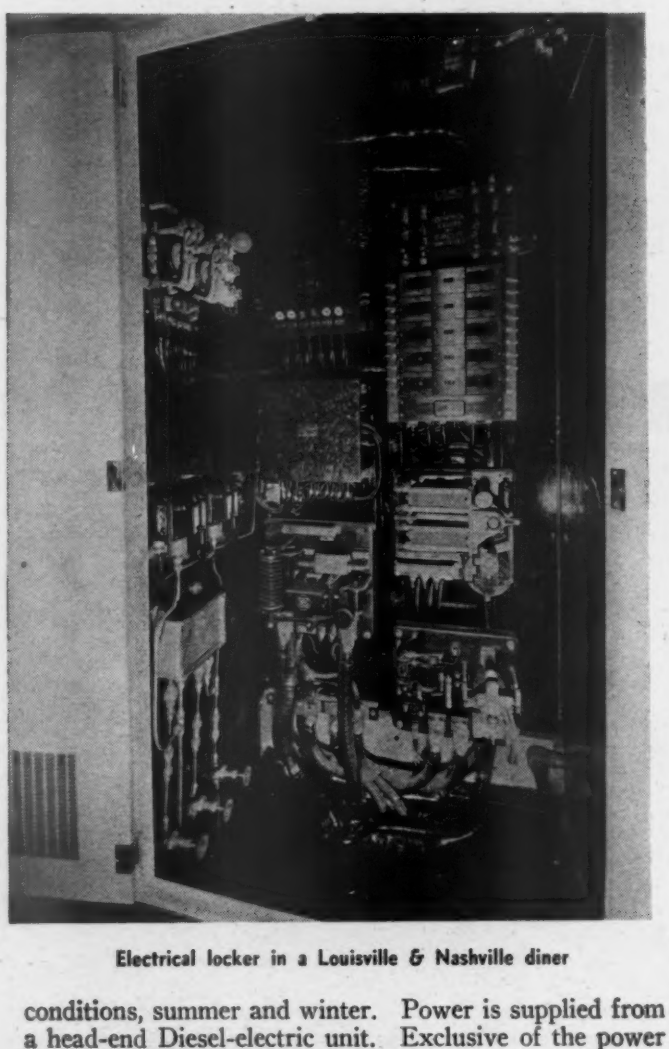
American Car and Foundry design

Cut-away power car for a high-speed double-end Diesel-electric train, showing glass partition and passageway

Extreme Lightweight Air-Conditioning Unit

The very lightweight air-conditioning unit is basically of aluminum construction and has a capacity of 10 tons of refrigeration. Two hermetically sealed, two-stage, five-hp., three-phase, 208-volt, Freon compressors, equipped with oil coolers and necessary valves are mounted on supports. Specially designed evaporative condenser refrigeration coils and electric air-heating coils are all housed in a refrigeration compartment.

All parts are easily accessible for maintenance through hinged access doors. The equipment is electrically controlled, automatically, so that the inside dry and wet bulb temperatures are based on outside atmospheric conditions, summer and winter. Power is supplied from a head-end Diesel-electric unit. Exclusive of the power unit, the total weight is 2,200 lb.



Electrical locker in a Louisville & Nashville diner

Things to Come

Borrowing a phrase from Drew Pearson, I will now crawl out on a slender limb and give you "some predictions of things to come".

An innovation in lighting has been conceived in a coach which we have named the "Sunliner". The notable feature in this arrangement is the fact that the light has been brought closer to the reading level. By being installed along the sidewall of the car, the fixture carrying the fluorescent tubes is not only a fixture but a conduit box eliminating all former conduits behind the side-wall finish and assuring low-cost maintenance. Another feature is that the underside of the baggage rack becomes a reflector, thereby contributing to even light distribution. A light source so close to the eye-level might seem objectionable, but through a new system of combining louvers into a plastic transparent cover, this objection is eliminated.

Formerly, night lights in cars were installed in the light fixture. In this arrangement the night lights are installed at the window posts and have an independent d.c. conduit also installed in the fixture. This conduit is fed directly from the battery, assuring continuous operation. The night lights, therefore, can also be used in an emergency.

We have also visualized a high-speed shuttle train. This train will have characteristics of an electrified unit depending on outside current supply. However, in the proposed design power is supplied by a power car in the center of the train. Diesel powered generators supply current to two axles in each car, assuring high acceleration and electric silent braking.

A notable feature of this train is that it will not have to be turned around. It can move equally well in both directions.

Both ends of the trian are arranged as observation lounges with the driver seated in a separate cab above. The power car is arranged with a passageway so that passengers can wander from one end of the train to the other.

Electronics will also enter into this picture of things to come. The use of electronics for cooking or defrosting and heating frozen foods offers unusual possibilities for railroad dining-car improvements. The weight of an electronic kitchen is estimated at less than 50 per cent of the standard kitchen and reduction in size will increase seating capacity approximately 50 per cent. The heat generated by standard stoves will be eliminated, thus making for improved sanitation in foot service.

The electronic kitchen permits the serving of many more meals so that trains formerly carrying two diners can serve better and more sanitary food in one electronic car, thus increasing passenger revenue of the train.

I have some predictions for the long neglected commuter. The railroads realize that commuter traffic must be improved and to this end various new ideas have been considered. We propose constructing a streamlined suburban coach in which interior features such as fluorescent lighting, electrically animated and sterilized air for cooling as well as heating are provided for passenger comfort.

The tendency toward hauling more passengers in individual sleeping rooms has prompted the conception of the "Railotel" car. This proposal provides space for 30 single-occupancy rooms with an upper and lower deck. The problem in such a car, which will demand refrigerated ice water in every room, ample ventilation, cooling and heating, is the power supply. Axle-driven generators are hardly capable of supplying the necessary power and an independent power generating unit must be placed in the car. However, as mentioned before, there is a trend towards head-end power which would make this type of car practical both to build and to operate.

The modern train is swift and prompt. The passengers may sit in comfort, read at leisure, watch the scenery or stroll through the cars. Meals are served in private rooms or in the dining car, as desired, and when the traveler retires, a soft, comfortable bed awaits for a restful sleep.

Millions of people have learned these advantages, as witnessed by the vast increase in train travel in the last ten years. Many more millions will experience them as the many new trains, embodying still more advanced ideas, which the car builders and railroads are now planning, are put into service.

Baldwin 1,500-Hp. Diesel

General purpose unit powered with turbocharged eight-cylinder engine weighs 140 tons—Starting tractive force is 56,000 lb. at 30 per cent adhesion

Several railroads have, within recent months, placed in service a type of general-purpose Diesel-electric locomotive developed by the Baldwin Locomotive Works, Philadelphia, Pa., which, with varying gear ratio selections, is adaptable to freight, passenger and road switching work.

The general characteristics of this locomotive are shown in the table. It has an over-all length of 58 ft. 0 in., weighs 280,000 lb. in working order, including the weight of steam generator and its water supply, and has a starting tractive force of 56,000 lb. at 30 per cent adhesion. With a gear ratio of 15:63 the continuous tractive force rating is 42,800 lb. and the maximum speed 62 m. p. h.

The locomotive is powered with a single 1,500-hp. turbo-supercharged Baldwin Diesel engine direct-connected to a Westinghouse generator.

The foundation of this locomotive is a cast-steel bed upon which is mounted the Diesel engine, electrical generating and control equipment, and the auxiliaries such as air compressors, cooling fans and traction motor blowers. All of the above-mentioned equipment is located ahead of the cab on the locomotive; to the rear of the cab are the steam generator and its control equipment mounted as a unit. The engine is placed on the underframe with the generator end adjacent to the operating cab so that the turbo-supercharger is on the left side of the locomotive and all of the electrical equipment is located in a compartment opening into the operating cab.

The prime mover of this locomotive is a Baldwin vertical eight-cylinder four-cycle Diesel engine equipped with an Elliott-Buchi turbocharger, developing 1,500 hp. (for traction) at an engine speed of 625 r. p. m. The engine has cylinders in line with a bore of 12¾ in. and a stroke of 15½ in. The engine bedplate is of welded steel construction with an integral extension supporting the main generator. The engine crankshaft is a solid heat-treated steel forging having 8¾-in. main bearings and 8⅜-in. crankpins. The engine frame is likewise a welded-steel structure forming the cylinder housing and the upper part of the crankcase. The cylinders are fitted with chrome-plated cast-iron liners, heat-treated aluminum-alloy pistons and annealed cast-iron cylinder heads.

The fuel injection system is the solid injection type with spring-loaded spray nozzles and individual fuel pumps for each cylinder. A motor-driven transfer pump takes the oil from the fuel storage tank located beneath the underframe and circulates it through filters to the fuel supply line from which the fuel injection pumps take their supply. The engine governor is of the hydraulic-

relay type gear-driven from the camshaft and controlled by means of an air-operated throttle from the operating cab. A centrifugal-trip type speed stop gear driven from the camshaft shuts down the engine if engine speed exceeds the maximum predetermined setting.

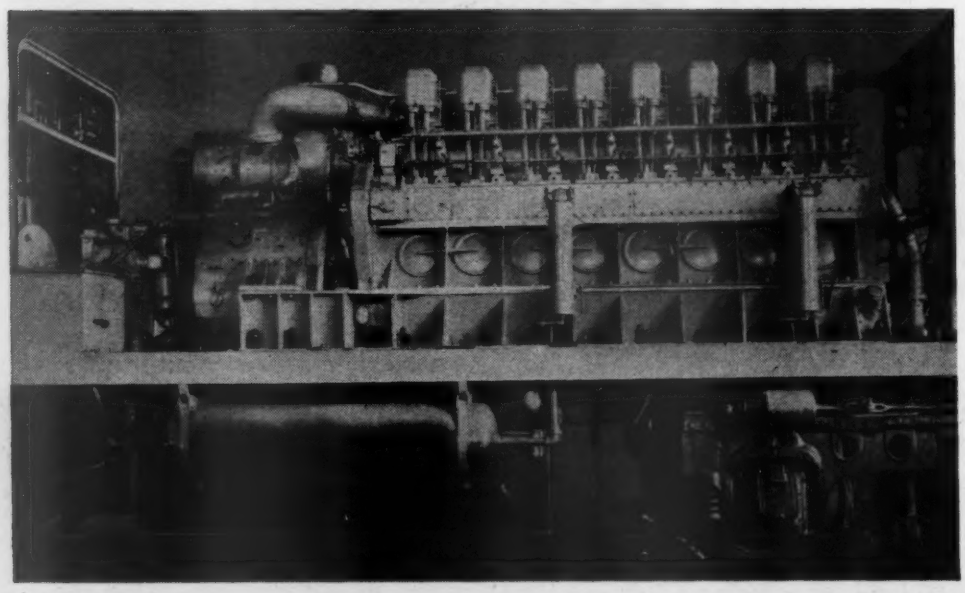
A detailed description of this type of engine and the turbocharger was included in an article describing the Seaboard Air Line 3,000-hp. Diesel-electric locomotive which appeared in the *Railway Mechanical Engineer* for February, 1946, page 55.

Engine Cooling Equipment

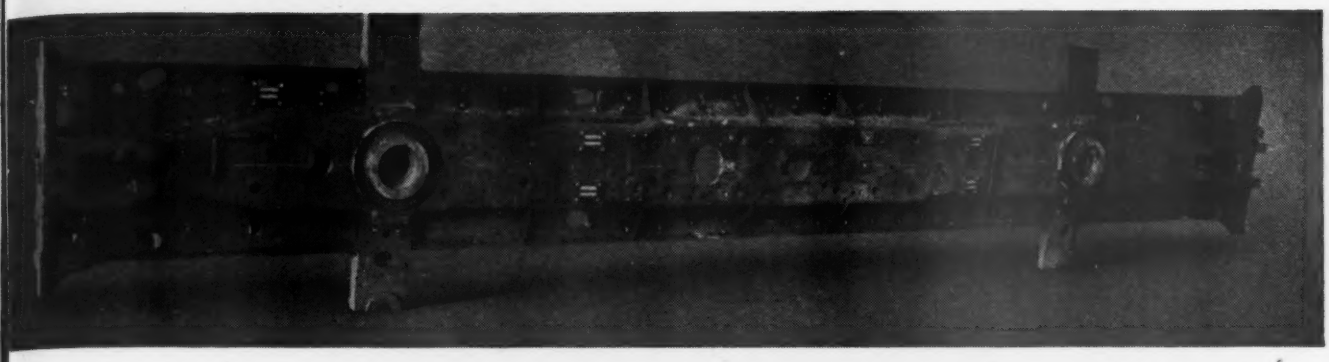
The engine cooling equipment, consisting of radiators, water pump, cooling fans and shutters, is located adjacent to the engine on the opposite end from the generator. The radiator compartment is next to the engine and houses the oil and water radiators, motor-driven cooling fans and automatic thermostatically-controlled shutters. A chain-driven centrifugal water pump mounted on the engine circulates the cooling water through the radiator and the engine. The radiator also embraces a section for cooling the lubricating oil, which is circulated through that portion of the radiator by a displacement gear pump chain-driven from the engine crankshaft. The lubricating oil supply is contained in the bedplate, whence it is drawn by the pump through a suction strainer and delivered to the radiator. After passing through the radiator, the oil flows through a strainer mounted on the engine on its way to the various engine parts.

General Characteristics of Baldwin 1,500-Hp. Diesel-Electric Locomotive

Track gage, ft.-in.	4—8½
Diesel engine:	
One, eight-cylinder, in-line, supercharged, b.hp. (for traction)	1,500
Driving motors:	
Number	Four
Type	370
Journal bearings (plain), size, in.	6½ X 12
Wheels:	
Driving, pairs	Four
Idling, pairs	Two
Diameter, in.	42
Wheelbase, ft.-in.:	
Truck	11—6
Total locomotive	43—9
Total weight, lb.:	
In working order	280,000
On drivers	187,000
Light	260,000
Maximum overall dimensions, ft.-in.:	
Width	10—2
Height	14—0
Length (inside knuckles)	58—0
Minimum radius curvature, locomotive with train, ft.	250 (23 deg.)
Supplies (total capacity):	
Lubricating oil, gal.	135
Fuel oil, gal.	1,000
Engine cooling water, gal.	300
Heating boiler water, gal.	800
Sand, cu. ft. (total)	30
Performance:	
Gear ratio	15:63
Tractive force, continuous, lb.	42,800
Speed at continuous rating, m.p.h.	10.5
Maximum safe speed, m.p.h.	65
Starting tractive force, (at 30 per cent adhesion), lb.	56,000

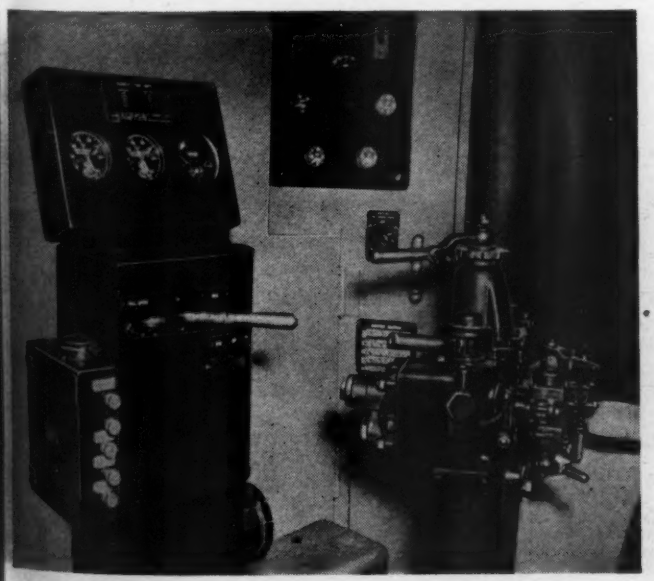


Left: The eight-cylinder, 1,500-hp. turbocharged Baldwin Diesel engine with electrical generating and control equipment—Below: The six-wheel trucks have traction motors geared to the outside axles and are equipped with clasp brakes



Above: The cast-steel locomotive bed—Right: The steam generator and controls are at the rear of the operator's cab — Below: The operating controls on the right side of the cab

The temperature of the engine cooling water and lubricating oil is controlled by thermostatic shutters which insure engine operation at correct temperature. Motor-driven propeller-type fans provide the cooling air.



Adjacent to the radiator compartment is a three-cylinder two-stage air compressor. The compressor is equipped with an unloading control set to unload at 140 lb. per sq. in.

At the opposite end of the locomotive from the radiator compartment is the steam-generator compartment housing a Vapor-Clarkson steam generator of 1,600 lb. per hr. capacity.

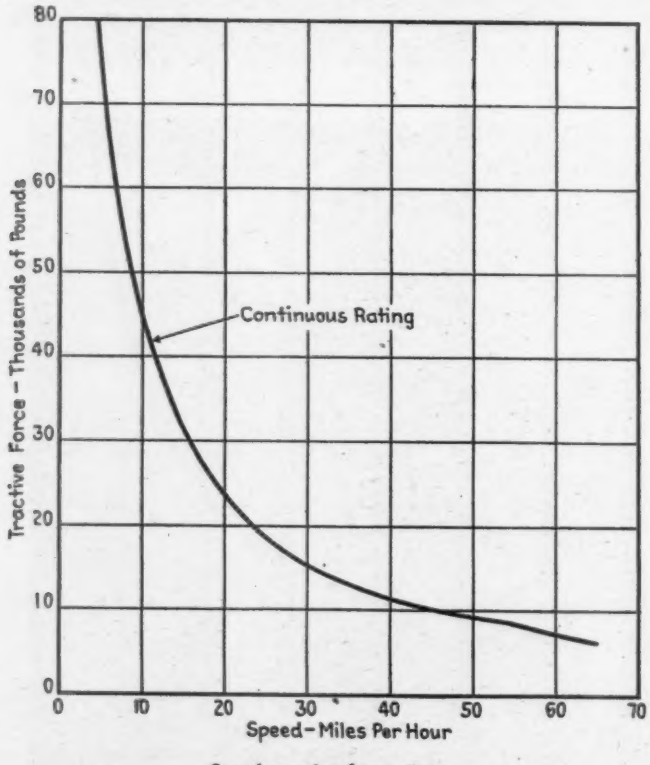
The locomotive is carried on two six-wheel, swing bolster, high-speed, pedestal-type swivel trucks of one-piece cast-steel frame construction having center plates fitted with high-carbon-steel side and bottom liners, oil-lubricated, and protected by dust guards. The truck pedestal jaws are likewise fitted with high-carbon-steel liners. The axles are mounted in plain bearings with 6½-in. by 12-in. journals and 42-in. rolled-steel wheels. The trucks are fitted with clasp brakes. The braking ratio is 75 per cent at a brake-cylinder pressure of 50 lb. per sq. in.

Electrical Equipment

The main generator is a Westinghouse Type 471, direct-current interpole, self-ventilating, separately-excited machine. It is supported from the Diesel engine bed plate with the armature solidly connected to the en-

gine crankshaft. The outboard end of the generator is fitted with a single self-alining roller bearing. The generator is used for cranking the engine with power derived from the battery. For this purpose, the generator is equipped with special field coils and an interlocked starting switch.

The outer axles on each of the six-wheel trucks are motor-driven, thus making for the locomotive an A1A-A1A wheel arrangement. The four Type 370 Westing-



Speed-tractive-force curve

house traction motors are series wound, force-ventilated and axle-hung with single reduction gearing to the axles. The motors are insulated entirely with Class B insulation. All four motors are permanently connected in series-parallel. Blower motors for cooling the traction motors are driven from the main generator, and there are flexible air ducts between the motors and the air conduit.

The auxiliary generator-exciter unit is mounted on the main generator and is driven by V-belts from the main-generator shaft extension. The auxiliary-generator part of the unit supplies power for charging the storage battery, control circuits, lighting circuits and fuel-pump motor. A voltage regulator holds the auxiliary generator voltage constant at all speeds. The exciter part of the unit is differentially wound. It supplies power for exciting the fields of the main generator, and in conjunction with an engine-control load regulator, maintains full engine output over the entire operating range.

One set of electro-pneumatic equipment is provided to control the operation of the traction motors from the generator. This includes unit switchers and a reverser in the main circuits. Wheel-slip relays operate a buzzer warning the engineman when slipping of a pair of wheels occurs. At the same time, power is automatically reduced until the wheels stop slipping, after which power is automatically reapplied to coincide with the position of the throttle. The cabinet housing the control apparatus is mounted in an easily accessible position adjacent to the cab.

The storage battery for engine starting, control circuits and lights is made up of 32 lead-acid type cells. The headlight is recessed and the number lights in the sides of the locomotive are electrically lighted.

The cab is constructed of electrically welded steel plates and shapes, the entire unit being rigidly secured to the underframe. The cab is fitted with both stationary and operable metal cab windows and doors, and both window and door frames are glazed with shatter-proof glass. The walls and ceiling of the cab are insulated. The cab is equipped on both sides with cushion seats having upholstered arm rests. The cab fixtures include pneumatic window wipers, fire extinguisher, cab lights, heater, brake gages, wheel-slip indicator, headlight and engine-compartment light controls, bell, horn and sander operating controls. The engine compartment just ahead of the cab is also constructed of steel substantially braced with carlines. It is designed for ready access to and removal of equipment and has roof hatches to provide access to engine heads, valve actuating mechanism and other equipment. Side louvers provide engine-compartment ventilation. Permanent lighting fixtures are installed in the engine compartment and the flooring is of the non-skid type.

Sand boxes with a total capacity of 30 cu. ft. are located at the ends of the locomotive and the sand is supplied to the rail by air-operated sanders. The sand boxes may be filled from outside the locomotive.

The fuel-oil tanks and air reservoirs are suspended beneath the locomotive underframe between the trucks and the steam generator water supply tank is located on the underframe beneath the generator.

* * *

One of four coaches recently completed at the Altoona, Pa., shops of the Pennsylvania

The coaches, the first part of an order of 93 coach, lounge, dining, special feature, and observation cars being built at Altoona to re-equip "The Trail Blazer" and "The Jeffersonian", are 85 ft. long and have a seating capacity of 44 each.—All-welded construction utilizing high-strength steels was employed in fabricating the cars.—The trucks, of the four-wheel type, are equipped with roller bearings.—The cars were designed by the railroad's mechanical department and styled by Raymond Loewy Associates.

Factors Involved in

Lubricating Oil Maintenance

By Brian Corrigan*

An explanation of the functions and adaptability of purification, filtration and reclamation of oil to maintain effective lubrication

EXTENDING the useful life of lubricating oil has been and continues to remain an important part of good equipment maintenance. While methods of oil purification, filtration or reclamation will assist materially in prolonging the useful life of lubricating oil, a more important requirement is proper application of the right type of lubricating oil to a given piece of equipment. Supplementing this, and equally important, is the necessity for operating and maintaining equipment in accordance with the instructions issued by the manufacturer. If the right type of lubricating oil is applied to equipment which is properly operated and maintained, the oil will provide satisfactory performance for relatively long periods of service before replacement is desirable.

Even though lubricating oil is accorded good treatment through proper operation and maintenance of equipment, it nevertheless deteriorates and becomes contaminated after extended periods of use. This is dependent, of course, upon the type and severity of service. The method used for purification, filtration or reclamation of the used oil and whether this should be done during operation or after removal of the oil from the system, require individual consideration, since obviously the cost of oil life extension must not exceed the value of the amount of new oil to be purchased if one of the methods is not used. The following discussion is presented to assist the operator of equipment to better evaluate his own particular problems of lubrication.

Characteristics of Used Oils

Used oils are characterized by one or more of the following conditions:

Oil which has deteriorated due to oxidation in the presence of air or other oxygen-containing media, accompanied by high temperature service. Products of oxidation may be soluble or insoluble in the used oil depending upon the degree of deterioration.

Oil which has deteriorated due to polymerization (linkage of unsaturated oil molecules to form progressively heavier molecules causing oil thickening), a result of high- as well as normal-temperature service. Products of polymerization may be soluble or insoluble in the used oil.

Oil which has been contaminated with extraneous matter. Products of contamination include:

Dirt and dust common to the region in which the equipment operates.

Core sand that has remained in metal castings from the time they were formed in the foundry.

Metal particles from the time equipment was in the repair shop.

Metal particles due to disintegration or wearing of parts such as bearings, piston rings, etc.

Carbon and other products of partial decomposition or oxidation resulting from destruction of oil or incomplete combustion of fuel.

Water and anti-freeze.

Dilution with fuels.

Miscellaneous, such as paint, asbestos, linseed oil, etc.

If used oils are to be continued in service, the products of oxidation and polymerization and any foreign contaminants should be removed. There are many ways of removing such materials from oil, but all fall into three basic types of equipment:

Gravity purification methods, such as gravity settling and centrifuging, which are capable of removing only insoluble materials.

Filtering equipment which can remove insolube matter and some soluble products depending on the type of the media.

Reclaiming methods which not only can remove insoluble materials but are also capable of removing varying amounts of soluble products depending upon equipment design and operating conditions.

Gravity Purification

Methods for gravity purification of lubricating oils include simple gravity settling followed by decantation or treatment by centrifuging either wet or dry.

The simplest means of effecting some degree of purification of used lubricating oil is to permit the oil to rest in a settling tank for a period of time. During this time, depending on temperature and efficiency of settling and decanting facilities, it is generally possible to remove the major part of the suspended insoluble oxidized material, foreign particles, dirt and water. Separation of such oil contaminants is made by gravity alone, and is adversely affected if stable emulsions exist.

Settling is most effective in horizontal tanks with vee-shaped or sloped bottoms and having either jacketed walls or steam coils for heating the oil to the proper temperature. Depending on oil viscosity, best results are obtained at oil temperatures of 120-160 deg. F. Obviously, excessive temperatures should be avoided to prevent the acceleration of oil oxidation. It is to be noted that practically no settling will occur while the oil is being heated because of the convection currents created. Also, settling at low temperatures should be avoided because the rate of separation is slowed up due to the highest viscosity of the oil.

Disadvantages of purifying oil by this method include the need of considerable space of settling tanks, a time of at least ten days is usually required for satisfactory clarification, and purification is not complete. Those insolubles which are close in gravity to that of the oil cannot be removed by this process.

Purification by this method is adaptable to all straight mineral oils, such as those used for lubricating Diesel and gas engines, air and refrigerating compressors, steam turbines and general plant equipment. It is important to realize that oils so handled are only partially clarified.

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They may still contain soluble oxidation and polymerization products as well as amounts of fuel dilution, depending on the type of service involved. Future use of purified oil will depend mainly on the length of service the oils have already undergone and their extent of oxidation and dilution. Heavy-duty, additive-type oils cannot be purified by this method with any degree of success because of their dispersion characteristic. This property prevents agglomeration of insoluble contaminants so that settling of these materials is all but impossible.

Treatment by Centrifuging

Purification by centrifuging employs the same basic principle as settling and decantation, but is faster and more complete because the separating force is several thousand times that of gravity. The centrifuge or centrifugal separator is a device for freeing the oil of suspended insoluble oxidized material, foreign mineral and carbonaceous matter, dirt and water. Claims are made that centrifuging an oil will also remove soluble oxidation products. This is generally not true, except in the case of some organic acids (only those more soluble in water than oil) which may be removed if water is added along with the oil being centrifuged. This is also true for mineral acids if present. Centrifuging wet, if started on new oil, will keep the accumulation of acids in the oil at a very low level. As with settling and decantation, a centrifuge will not separate liquids which are mutually soluble, such as fuel in lubricating oil. Likewise this method of purification will not remove colloidal foreign matter, particularly from heavy-duty engine oils with dispersant properties.

Filtration

Oil filters are of many types and when used are almost always installed in connection with the equipment being lubricated. Such filters are generally used in the force-feed lubricating systems of internal combustion engines regardless of the type of service. Gas, gasoline, tractor and Diesel engines fall in this category.

Oil filters under this heading are composed of housings in which removable elements or cells may be placed. When elements become partially clogged with oil contaminants, they can either be removed and cleaned or replaced with new elements, depending on type. Such an installation makes for simplicity in maintaining reasonably satisfactory oil performance. There is another type of oil filter composed of a housing and element in one unit. When this type becomes clogged, it is necessary to replace the whole assembly.

Depending on the kind, oil filters are capable of removing insoluble oxidized material, foreign mineral and metal particles, carbonaceous matter, water and dirt, and in certain cases some soluble oxidation products. Oil filters will not separate mutually soluble liquids, such as diluent or fuel from lubricating oil. Types of oil filters may be classified as follows:

Metallic or mechanical (edge-type, copper ribbon, steel wool, screen, strainer). Filters of this type remove coarse contaminants such as metal chips and particles of grit and scale by means of closely woven metal screens. Removal of insoluble oxidized material is generally not effected unless the size of such particles is sufficiently large to be caught by the filter element openings. Soluble oxidized material, finely divided carbon particles, water, dust and finer insoluble oxidation products cannot be removed by such filters.

Absorbent (cotton waste, wood pulp, wound yarn, felt, flannel, cloth, paper, mineral wool, quartz, diatomaceous earth, asbestos). Filters of this type not only remove coarse contaminants but also aid in the removal of finer insoluble particles such as carbon, dust and insoluble oxidized material. Certain of these filters remove mineral acids as well as water. Soluble oxidation products are not removed. Filtration is accomplished by adhesion of contaminants to element structures, and absorption by the components of the filter due to porosity.

Adsorbent (Fuller's earth, boneblack, charcoal, other active-type clays, chemically treated paper and waste). In addition to removing coarse and fine contaminants, filters of this type are capable of reducing the amounts of soluble oxidized material and water to a limited extent. Such filters remove oil contaminants not only by mechanical means, but also as a result of chemical action and adsorption. Adsorbent filters may remove chemical additives blended with certain oils to improve performance characteristics, but this is not true in all cases.

Oil filters may be installed to operate on either full flow or the by-pass system. In the full-flow, one filter receives the total oil supply from the pump discharge. Metallic- or mechanical-type filters are generally used for this purpose. In the by-pass arrangement, one filter receives only a portion of the oil circulating in the system. Absorbent- and adsorbent-type filters are generally used for this purpose.

It should be pointed out that practically all types of filters are equipped with means of by-passing the oil when filter clogging occurs. Oil filtration is almost always employed in conjunction with internal-combustion-engine installations and is also used to some extent in connection with other equipment. For instance, filters of the absorbent or adsorbent types are sometimes used to supplement methods of oil purification (batch or centrifuge) in turbine installations. Where large oil storage facilities are available, metallic- or mechanical-type filters are generally used in the lines between tanks and equipment to be lubricated. Oil filters may be used in any lubricating system where sufficient pressure is available to force the oil through the filtering medium.

Lubricating Oil Reclamation

Used lubricating oils can be reclaimed or refined by a variety of methods. In the high-temperature clay-type oil reclaimer oil is purified by contact with Fuller's earth or similar activated clays. This can be done in batch or by continuous treatment. These reclaimers remove most of the solids present in used lubricating oil such as mineral matter, dirt and carbonaceous material. Soluble oxidation products, which are responsible for varnish and lacquer formations on hot engine surfaces, are reduced to an extent varying with clay efficiency, clay-to-oil ratio and operating conditions. This reclaiming method also reduces the amounts of water and organic acidity which may be present in the used oil. In this process the oil is often heated to 400 deg. F., and in some reclaimers even higher under vacuum, which means volatile liquids such as gasoline are substantially removed. If used oil is contaminated with Diesel fuel, however, only a portion of the fuel can be removed unless the reclaiming temperature is raised considerably above 600 deg. F. Reclaiming at this temperature, however may volatilize some of the lighter lubricating oil ends which will pass off with the diluent. The recovered oil will then be appreciably higher in viscosity than when new. If reclaimers are operated at temperatures much above 600 deg. F. cracking of the oil will result. Higher-temperature clay reclaimers will also remove most chemical materials which may have been added to lubricants to improve certain performance characteristics. For this reason clay type reclaimers should not be used to reclaim used additive oils unless the reclaimed

Comparison of Purification, Filtration and Reclamation Methods

	Gravity purification			Filtration			Reclamation	
	Gravity settling	Centrifuging Dry	Centrifuging Wet	Mechanical Inactive	Adsorption Inactive	Adsorption Active	Clay-type reclaimers Active	Chemical treatment Active
Filtering media	...	...	...					
Application to systems:								
Full-flow	No	No	No	Yes	Not generally	Not generally	No	No
By-pass	No	Yes	Yes	Yes	Yes	Yes	Sometimes	No
Batch	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contaminants removed:								
Insoluble solids:								
Large particle size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Small particle size	No	Some[1]	Most	No	Yes	Yes	Yes	Yes
Insoluble oxidation products:								
Agglomerated	Some	Most	Yes	Some[2]	Yes	Yes	Yes	Yes
Dispersed	No	No	Some	No	Some	Yes	Yes	Yes
Soluble oxidation products	No	No	No	No	No	Most[3]	Yes	Yes
Water and water-soluble materials	Yes	Yes	Yes	No	Some	Some	Yes	Yes
Removal of oil additives	No	No	Some[4]	No	No	Some[5]	Yes	Yes

[1] Providing gravity heavier than oil
[2] Depending upon size of agglomerates
[3] Depending upon type of media
[4] Only those which are water sensitive
[5] Depending upon type of additive

oil is relegated to some service not requiring heavy-duty or additive-type lubricants.

In a typical reclaimer a batch of used oil is placed in a cylindrical tank and heated electrically. Clay may be added and mixed by mechanical agitation prior to high-temperature heating or after the oil has reached the proper temperature, usually around 400-425 deg. F. This temperature is an average one for reclaiming used stocks of Diesel and gasoline-engine cranckcase oils. Following the agitation and heating period, which may vary from 15 minutes to an hour's time, the oil and clay mixture is forced by means of compressed air through one- or two-stage paper filter presses which remove both clay and impurities. In another type of reclaimer the oil is pumped over a hot surface (electrically heated) which drives off water and fuel diluents. The hot oil is then passed through a bed of clay and a layer of filter paper which removes the remaining contaminants. This process is considerably slower than the one previously discussed. In still a third type of reclaimer employing contact filtration, a continual draft of air is blown over the oil being heated and mixed with clay. This aids in removing fuel dilution by hastening evaporation.

There is no limit to the amount of used oil which can be reclaimed by this general method, providing several units are of use. If the used oil is in fairly good condition, the amount of oil reclaimed will approximate the maximum rated capacity of the unit. If, on the other hand, the oil is badly contaminated and oxidized, the flow rate may be as low as 50 per cent of the maximum rated capacity. The presence of water or chemical additives in the oil may reduce the flow rate appreciably. The flow rate will also be influenced by the clay-to-oil ratio. The percentage of oil recovered from the reclaimer will vary from 50 to 95 or more per cent of the oil charged, depending upon reclaimer design, condition of the oil, amount of clay used per gallon of oil, and method of operation.

Advantages of using high temperature clay-type reclaimers are:

When this process is applied to straight mineral oils, and properly carried out, it is generally possible to produce a reclaimed oil having physical tests approximating those of the original product. This does not imply that reclaimed oil is equivalent to new oil in actual service.

While the reclaimed oil is not as satisfactory as the original oil, this is partially compensated for by the fact that where reclaiming units are installed, the oil is generally changed and reclaimed more frequently so that the average oil condition is maintained at a reasonably good standard. Addition of new oil as make-up also improves the quality of the reclaimed oil.

Disadvantages of this type of process are:

The quality of reclaimed oil is not as good as new oil from a performance point of view.

In small installations where the amount of oil involved is small, or even in larger installations where the oil is not rapidly contaminated or oxidized, the high first cost of the reclaiming equipment may not be justified. Also operating costs, including the cost of clay and extra manpower, may not be warranted. In such instances more economical lubrication can be had by periodic oil change.

More highly skilled personnel are required to handle properly reclaiming of used oil than are necessary for changing oil.

The reclaiming process cannot be applied to oils containing additives unless use can be found for the reclaimed oil in applications where the presence of additives is unnecessary.

Chemical Treatment

The reclaiming of oil by chemical treatment is generally carried out in connection with clay treatment either by treatment with alkaline or caustic solutions or by acid treatment followed by caustic or clay neutralization.

As these two chemical treatments are both used in the refining of new oil, it is to be expected that better reclaimed products can be produced than from other methods of oil purifications and reclaiming. The procedures, however, are much more complex and trained personnel are required. Also, experimentation is generally required to determine suitable operating conditions for the treatments.

Due to the complex nature of these two processes, it is impossible to outline definite procedures to be followed. Wide variations exist in the type and condition of used lubricants to be handled, and the proper treatment of particular batches of oil must be considered individually to obtain best results. Since additive materials are removed by these processes, they should never be used for the reclaiming of additive oils unless use can be found for the reclaimed oil where the presence of additives is unnecessary.

Alkaline Treatment

In the treatment with alkaline or caustic solutions, generally the oil is heated to about 150 deg. F. and mixed thoroughly with 10 per cent alkaline solution for a considerable period of time in order to get satisfactory contact. Following this, the mixture is allowed to settle and the caustic solution and solids are drawn off at the tank bottom. The oil is then washed with water until the water appears clear when it is drawn off. To insure thorough washing, the wash water should be tested with an indi-

(*Continued on page 122*)

American Steel Foundries

Coil-Spring Test Machine

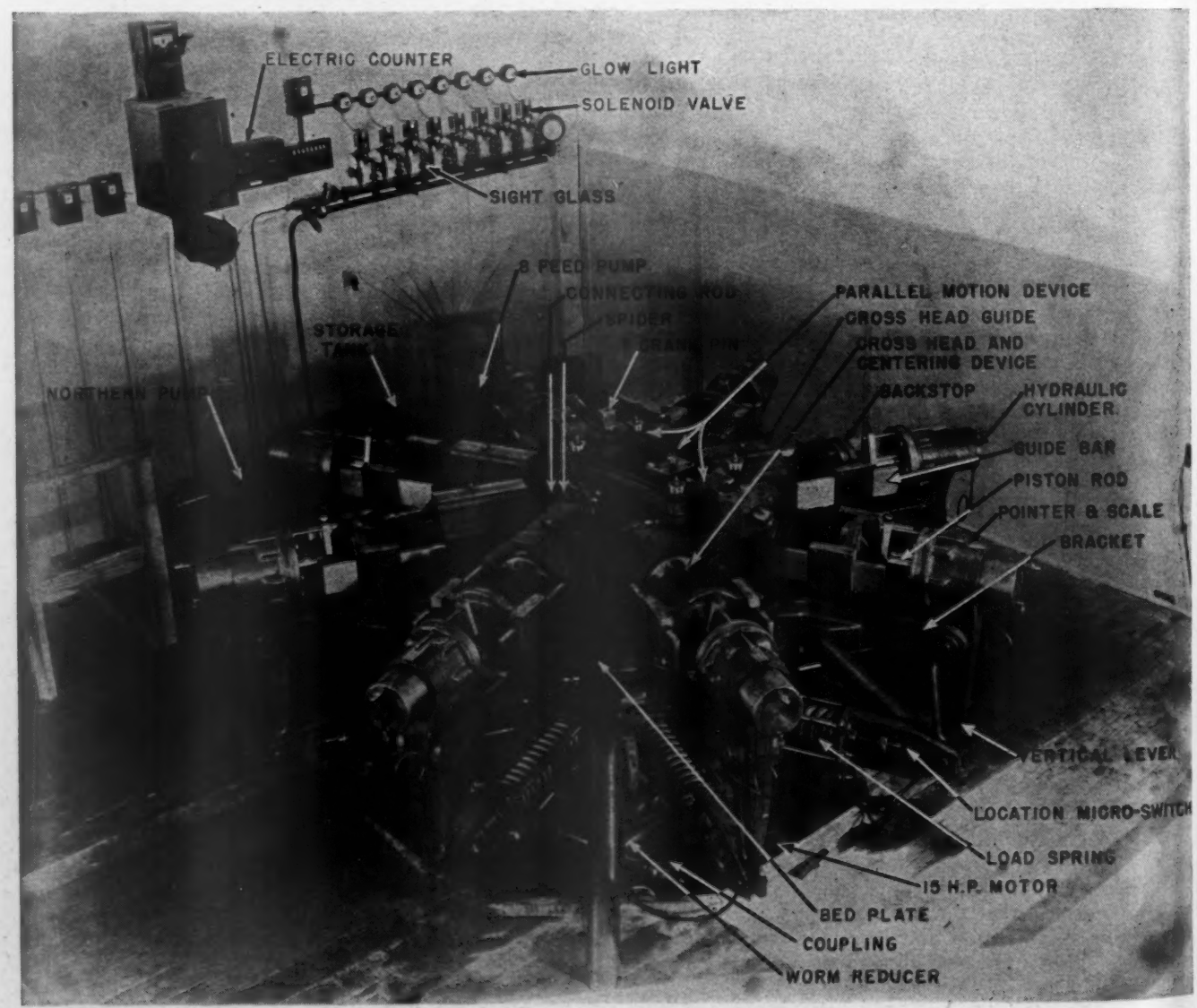
Eight springs, radially disposed about a central crank shaft, are alternately compressed and released 12,000 times an hour, making fatigue testing practicable

IT has been said that fatigue of metals is due to minor details. Unfortunately there are many minor details and a few larger ones. The various combinations of these details are such as to make necessary the testing of large numbers of fatigue specimens to get worth-while results.

In the case of heavy hot-wound springs, under some conditions it may be necessary to test as many as 100 springs up to and beyond 2,000,000 cycles per spring to get an answer to some spring problem. The physical work, time necessary, and expense have prevented adequate testing of this kind.

Hot-wound-spring designers have long desired to know the effect of various hardnesses, of shot peening, different methods of heat treating, various alloys, surface conditions at different hardnesses, decarburization of surface, effect of surface corrosion, and endless combinations of these factors.

For the past ten years American Steel Foundries have used modified punch presses for testing. One press could test up to a load of 35,000 lb. and the others to 18,000 lb. This capacity could be divided into a number of springs, although usually one or two springs were tested. By static testing, the length of spring for various loads was determined, and springs were clamped to the desired length. The base of the press was adjusted so that on the down stroke the spring was compressed to give the proper travel.



A. S. F. radial airplane-type coil-spring testing machine

The difficulty of this arrangement was that springs were tested by measurement of length rather than by maintenance of load. Any set given a spring reduced both load and stress. To prevent this, springs were periodically removed from the machine for check as to set and adjustments made to maintain the proper stress range.

Machine speeds were limited to about 50 cycles per minute and, with delays for checking set, it was possible to get only about 2,000 cycles per hour. The operational cost for labor and power was high and any considerable program of testing would take years.

Performance of the New Testing Machine

Accordingly, American Steel Foundries designed and built a special fatigue testing machine designed to take all railroad freight car truck springs and a majority of passenger car and locomotive as well as industrial helical springs. The capacity of the machine is as follows: Bar diameter of spring up to 1¾ in.; free length of springs up to 12 in.; outside spring diameters up to 8 in.; stroke up to 4½ in.; maximum load capacity per spring, 16,000 lb.; machine capacity, 8 springs to be tested simultaneously; speed variation, 85 to 250 cycles per minute.

It was decided that all testing should be done with spring ends against parallel plates; also the machine should be so designed as to maintain a predetermined load and exact stroke at all times. A device should be incorporated to maintain load in spite of shortening of spring due to set or possible lengthening from heat. Auxiliary means were to be provided for initial compression of springs in machine. Suitable counters, stroke indicators, and cooling means were also to be provided.

The radial airplane motor supplied the basic idea for the spring testing machine. One crank pin is desirable for simplicity in obtaining a variable stroke, and the radial arrangement of springs makes it possible to balance the spring loads. If all eight springs were compressed to capacity at once, a force of 128,000 lb. would be necessary. Using the radial arrangement, forces are largely cancelled out so that theoretically no power is required to operate the machine except to overcome friction. The radial arrangement also brings the springs out where they are accessible for installation and observation during test.

How Power Is Supplied

Power is supplied by a 15-hp. Westinghouse d. c. variable-speed motor, Type SK, having a speed ratio of 3 to 1. This drives a heavy-duty Type WV-70 Link Belt worm reducer. The gear reducer has a vertical output shaft and is coupled to the testing machine main shaft through a Link Belt flexible coupling.

S. K. F. taper roller bearings support the vertical shaft, the upper bearing of 7.75 in. diameter taking a maximum radial load of 73,000 lb. and a 6⅛-in. lower bearing taking less radial load but all thrust load. A Chicago Rawhide seal prevents oil leakage below the lower bearing.

The vertical shaft is forged from alloy steel, heat treated to 80,000 lb. per sq. in. minimum yield. At the upper end is a disc integral with a 7¾ in. diameter shaft and with 1⅛ in. eccentricity to the shaft. Over this disc is another disc with an integral crank pin having the same eccentricity to its disc. The two discs are clamped together by means of a ring below the main shaft disc and cap screws hold the upper disc, lower disc and ring together. By varying the angular relation of the two discs, the crank pin may have an eccentricity of 0 in. to 2¼ in. with respect to main shaft, thus giving the crosshead a stroke of from 0 in. to 4½ in. as desired.

Crank pin is 4 in. in diameter and has mounted on it a spider provided with 8 connecting rod bearings and two additional bearings for a parallel motion device to be later described. Roller bearings made by Orange Roller Bearing Company are used at these points and elsewhere throughout the machine.

Attached to the crank pin spider are eight connecting rods extending outward. Attached to each connecting rod is a piston-like crosshead guided by crosshead guides. The ratio of length of connecting rod to stroke is greater than is radial engine practice to bring down the loads on guides, making adjustable guides unnecessary.

Parallel-Motion Device Installed

Radial engines employ a master connecting rod attached to one piston, and the other connecting rods are fastened to the master rod. This results in unequal strokes for the pistons. Accordingly a parallel-motion device, consisting of two connecting rods attached at one end to the spider and at the other to a guided crosshead, was designed which insures that each wrist pin in the spider travels in a circle and each crosshead has equal stroke. Normally, with all springs in place and equally loaded, the parallel motion device has but little work to do. When the machine is unbalanced due to spring breakage or when starting up with springs unequally loaded, forces of considerable magnitude are set up, making it necessary to design the parallel motion device with strong members and adequate bearings.

Attached to the circular bed plate of the spring testing machine are eight brackets in line with and underneath the crossheads and guides. These brackets support vertical levers having a 2 to 1 ratio, the shorter lever arm being above the bracket. Within the upper portion of each lever is a hydraulic cylinder capable of taking the reaction of springs being tested. Hydraulic cylinder piston rods are connected to spring backstops. These backstops are guided on bars attached to the piston crosshead, insuring parallel motion of backstop so that springs will be tested between parallel plates and not subjected to additional stresses as would be the case if they were compressed between nonparallel plates.

An adjustable pointer attached to the piston rod reads on a scale above the hydraulic cylinder indicating piston travel and is a ready means of noting change in loading conditions.

The spring reaction tends to force vertical levers inward at the bottom. This force is resisted by a load spring which is set at a load equal to ½ the maximum desired test load on the spring. This is on account of the 2 to 1 lever ratio.

Micro-Switch to Limit Spring Travel

Arranged within the load-spring mechanism is a microswitch designed to close upon .005 in. travel of load spring. The load-spring unit is adjusted under a static compression testing machine so that the switch closes at ½ of the desired spring test load. The load-spring unit consists of an outer and inner spring. Either or both may be used, although for all testing down to 4,000-lb. springs, both springs are used. At the maximum testing load of 16,000 lb. on the test spring, load spring stress is 73,000 lb. per sq. in., thus insuring a load-spring accuracy and freedom from set and fatigue. In addition, load-spring travel is only .005 in. and motion occurs only once every few minutes.

The reaction from the load spring is taken on the center column of the machine and tends to be balanced by other load-spring reactions.

A small high-pressure pump supplied by Northern Ordnance, Inc., with a capacity of .435 gal. per min. at 1,000 lb. per sq. in., pumps oil into the hydraulic cylinders for

initial compression of springs. After that an 8-feed Hills-McCanna lubricator continues feeding oil at a slow constant rate. This tends to compress springs constantly and, if allowed to continue, would overload them. However, when correct loading is reached, micro-switches in the load spring units close and energize solenoid valves in corresponding hydraulic cylinder lines, thus releasing a few drops of oil and maintaining correct loading. This simple device maintains correct loading with great exactness and provides for taking up spring set and also for backing off if the spring or spring-testing machine change of temperature causes the load on the spring to increase over the set test load.

Connected to each solenoid valve is a small neon glow light which enables operation of solenoid valves to be observed. In addition, the discharge from valves may be seen in glass sights. Excess oil is returned to a storage tank which supplies both the Northern pump and the lubricator.

Method of Counting Machine Revolutions

The counting of machine revolutions is important and, to prevent failure, an electrical counter made by the Production Instrument Company is used. It is operated by a switch closed by a cam on a coupling between the gear reducer and the vertical shaft. An electronic switch is also used as a standby, the light shield being attached to the same coupling. In addition a purely mechanical counter is driven by the parallel motion shaft.

Checking the stroke may be done with the machine running by a scale moved against the parallel-motion crosshead. The scale, moved by the throw of the crank pin, has scale divisions, which permit reading the stroke in inches.

Due to the deflection of parts and bearing clearances, the motion of the spring may not be exactly the same as the stroke of the machine. Accordingly, the actual motion of springs is read by a portable device using a scale and sliders which show the stroke no matter what length of spring is being tested and regardless of spring set.

Spring set is plotted by the use of special calipers which give the distance between the piston and the backstop when the spring is fully compressed. These readings are plotted on a chart and a line connecting the end of each plotting forms a curve of set. Should there be any irregular action of the hydraulic system, it will show up on these plottings at once.

In order to center the springs in the machine, centering devices are attached to the backstop and the piston head. They work like universal lathe chucks and are quickly set for change of spring diameters. Pads under the centering devices are used to adjust for long or short springs.

Orange roller bearings, used everywhere except on the main shaft, are lubricated by Alemite connections. Main bearings are lubricated by a circulating oil system which is supplied by full travel of one feed of a 10-feed Hills-McCanna lubricator. Piston crossheads are lubricated by other pumps in the same lubricator.

Operating at capacity requires less than 5 hp. Due to the flat circular machine bed, vertical air currents are prevented from passing upward to cool the motion parts. Accordingly, a centrifugal blower on the roof has been provided to blow 4,000 cu. ft. of air downward on top of the machine, thus cooling it and ventilating the room. A draft gate regulates the flow of air when full capacity is not needed. Ventilation is required only during hot weather when testing heavy springs.

Compared to previous testing machines for heavy springs, the new American Steel Foundries testing machine has an output about 40 times as great. Testing 8 springs at a time at 200 cycles per minute, 12,000 per hour and 96,000 per 8-hr. shift, rapid and accurate testing is possible and, for the first time, a real program of fatigue testing may be realized.

Lubricating Oil Maintenance

(*Continued from page 119*)

cator and washing continued until the water drawn off is essentially neutral. Following the washing, the oil is either filtered or centrifuged to remove the last traces of water. Sometimes it is necessary to filter the oil through adsorbent clay or to redistill the oil to remove organic soaps which are oil soluble. Partial or complete distillation is necessary if the products of dilution are to be removed.

Treatment with Acid

In the acid treatment the oil is allowed to rest in a storage tank to promote settling of insoluble matter. The settled oil is then mixed with acid (dilute sulfuric acid normally about 10 per cent) at a suitable temperature and the acid sludge is settled and drawn off. Further treatment is necessary to remove the last traces of acidic components. If these materials are inorganic in nature, clay treatment alone will generally remove them. If organic acids are present in appreciable amounts, it may be necessary to caustic wash the oil to convert them into soaps, which can be removed by subsequent clay filtration. After clay treatment, some method of separating the clay from the oil, such as filtering, must be employed.

Using this procedure, oil may be treated with acid in a single or in several steps. Multiple-step treatment is preferred because temperatures are more easily controlled and any water present in the oil is removed by the first batch of acid and thus does not dilute the subsequent acid batches thereby impairing their reclaiming powers. When multiple-step treatment is used, the acid sludge is drawn off before each acid addition.

Some of the disadvantages to reclaiming used oils through chemical treatment are:

The treatment has to be carried out by personnel well acquainted with the subject under the supervision of qualified technicians.

Experimentation is necessary to determine the proper concentration of acid and temperature of operation to give best results.

Emulsion troubles may be encountered, especially with heavy oils, highly oxidized oils, or those containing additives.

Treatment losses are usually high.

The process is uneconomical unless carried out on large volumes of oil.

Additives are removed from heavy-duty oils. Chemical treatment of used lubricating oil is perhaps the best method for reclaiming when proper equipment and suitable personnel are available.

A most important consideration, and one which must not be overlooked when selecting a method for extending the useful life of an oil, is that the oil after purification, filtration or reclamation must still be able satisfactorily to perform the function for which the new oil was designed and recommended. A close check by laboratory inspection, or established routine of operation, should therefore be maintained, once it has been established that a selected method of procedure will give satisfactory performance.

EDITORIALS

Added Service For Our Readers

With this issue the *Railway Mechanical Engineer* introduces to its many readers in shops and enginehouses a new series of questions and answers having to do with the construction, maintenance and servicing of locomotives—both steam and Diesel—a feature which will not only serve to broaden the coverage of the problems of locomotive maintenance and operation but to take in those questions relating to machinery, accessories and tender but will open up a new service wherein our readers will have a "service department" from which they may get the same special help on mechanical problems that the men in the boiler department have made use of in ever-increasing numbers for almost 30 years.

We're not sure that we can put our finger on the exact reason why railroad men like the question-and-answer method of garnering information on the multitude of problems with which they are beset every day of their lives but we are suspicious that one of the reasons why most railroad men like their jobs so well (in spite of all protests to the contrary) and take a great deal of pride in their knowledge of their jobs is simply that they are inherently and eternally curious about the reasons why things around a railroad work—or don't work—and the desire to find a better way to do these jobs than the other fellow may have found. This curiosity breaks out, naturally, in the questions that are asked at almost every meeting of railroad men and the thousands of questions that are asked of the service and sales representatives of the supply companies, and the only reason why railroad men don't ask more and more questions of other railroad men is that they don't get a chance to see each other very often. That's where we come in, for we have discovered, over a period of many years, that the question and answer method has become so popular with all classes of railroaders that they make their displeasure known immediately if for some unavoidable reason we do not have material in a certain series to publish for an issue or two. So, in order to provide that "central information bureau" where locomotive men may find the answers to their questions, we are now adding to the Boiler Questions and Answers series the Questions and Answers on Locomotive Practice. Nor should we overlook mention of the Air Brake Questions and Answers which, right now, are dealing with Diesel-electric locomotive brake equipment.

It may also be that another—and possibly the most important—underlying reason is that in the questions and answers, especially those dealing with the locomotive boiler, the men interested in that phase of railroad work recognize a quality in the answers to their questions that can only come through long and intimate contact with the problems involved. In preparing this announcement of the new series of Questions and Answers on Locomotive Practice, it occurred to us that our readers might like to know something about the man who has conducted the boiler question and answer department for the past 20 years. George M. Davies took over the conduct of this department in the former publication, The Boiler Maker, and since September, 1928, with the exception of a few special issues, he has carried on without interruption. Mr. Davies is eminently qualified by training and experience to deal with the many problems that railroad men bring to his attention through the columns of this publication. He has been connected, in an engineering capacity, with one of the nation's largest railroad systems since 1926 and his everyday job is one that takes him into every department of many shops and engine terminals in the course of a year. Before he entered railroad service he spent several years in the engineering department of the American Locomotive Company at its Schenectady, N. Y., plant where he obtained the groundwork for his training in the fundamentals of locomotive design and construction.

It is with distinct pleasure that we are able to tell our readers that Mr. Davies is extending the scope of his efforts now to include questions and answers pertaining to other parts of the locomotive than the boiler. Having had an opportunity to look over the preliminary material on Mr. Davies' new series of questions and answers, the first of which appear on page 126 of this issue, we feel confident that those of you who make use of this new service will find it just as valuable as have those who have used the boiler department over the past years.

Silicone Insulation For Traction Motors

Tests made during the past three years by the Dow Corning Corporation, Midland, Mich., indicate that Class "B" motors using silicone resin insulation in place of older types of varnishes will last 900 times as long under identical service conditions. Class "B" motors are those which are insulated with mica, glass and asbestos, as distinguished from the cotton, silk or paper used with Class "A" motors. The mica, glass or asbestos alone are insufficient since some other material

such as a varnish or resin must be used as a binder, as a material to seal the interstices in the other insulation and to provide a protective moisture-proof coating.

This development is of special interest to users of traction motors for electric and Diesel-electric locomotives. It offers a means for greatly extending their life, and at least a part of such life extension may be exchanged for higher temperature operation. The higher temperatures permitted by the use of silicone mean greater motor capacity, motors of a smaller size or a combination of both.

Before silicone can be adopted, there are a number of practical problems to be overcome. Under present operating conditions, Diesel-electric traction motors on road locomotives are overhauled at intervals controlled by miles of operation, usually 150,000 or 200,000 miles. At these times, they are thoroughly cleaned, bearings reconditioned, wearing parts restored to size and the armatures impregnated with insulating varnish and baked. The most effective means of cleaning is a vapor method in which the vapors from boiling trichlorethylene or perchlorethylene are caused to condense on an armature or frame suspended in the vapor. This method is not recommended for use with silicone resins, since these chemicals are solvents for silicone, and would remove much of it and perhaps destroy the insulating qualities of that which remained. Manufacturers generally are opposed to the use of this kind of cleaning for any type of insulation unless it is done under carefully controlled conditions. It is used on railway traction motors, however, apparently with great success. There is no evidence available to show that it damages the types of varnish used, but it probably could not be adapted to silicone. And to fully realize all the advantages of silicone insulation, all of the varnish should be silicone. In other words, it would appear impracticable to protect one kind of varnish with a coating of another, or to try to improve motors, now in operation by impregnating them with silicone. To obtain the advantages offered by this new product, the motor should be built with it.

There are also other practical problems to be considered. One railroad maintenance shops reports that 90 per cent of its motor failures are bearing failures. Many bearings which have not failed come into the shop containing grease which has so broken down, it is no longer a lubricant. One railroad operator thinks the bearings should be larger, and another believes the situation can be corrected with higher temperature lubricants. It also seems probable that oil-lubricated bearings may be the answer. Another proposal is to use silicone greases. They are not quite as effective lubricants as petroleum greases, but they do not break down under relatively high temperatures, and they show comparatively little change in viscosity with change in temperature. The use of silicone insulating resins might conceivably aggravate this condition since higher armature temperatures might cause an increase of bearing temperatures.

As it may be applied to electric and Diesel-electric motors, there are some obstacles to the use of silicone. If its cost is higher and it must be reapplied at the same intervals, its use might be questioned, but the advantage of higher temperature operation, increased resistance to moisture with resulting longer life certainly warrant a thorough trial. Insofar as insulation is concerned it offers intriguing possibilities for greatly extending the overhaul periods.

Stepping-Up Mechanical Department Effectiveness

When we offered two sets of three prizes each—the first prize in each case to be $250 and the second $125—for the best papers submitted on or before May 1, 1947, on each of three questions pertaining to present acute problems of the mechanical department, we were confident that mechanical-department officers and supervisors had been deeply engrossed in the study of their problems since the end of the war. Many of them, we believed, were ready to "tell the world" their convictions, given a suitable opportunity. The first contribution we received almost by return mail!

Letters calling attention to our announcement were sent out to general mechanical-department officers. Replies to these letters have called for over three hundred additional copies of the announcement for circulation among supervisors, and the expressions of approval of the competition by these correspondents have been most encouraging. One writer asked whether our failure to mention that all papers should include the names and addresses of writers signified that the competition was to be conducted incognito. Of course, all papers must bear the names and connections of the authors. Names will be withheld from publication, however, at the specific request of the authors.

Do not forget the closing date—May 1, 1947—or that papers should not exceed 2,000 words and may be accompanied by illustrating material. Again, here are the three questions:

1. What is the problem of outstanding importance with respect to the maintenance and utilization of locomotives and what do you consider the best way to meet it? The following phases are suggestive only: Maximum utilization of steam locomotives. Maintenance policies and methods for Diesel locomotives. Shop and terminal facilities for either or both types of motive power.

2. The car department has come through the war facing some new problems and some old problems which now appear in much aggravated form. What do you think is the most important of these problems and what

ought to be done about it? They may arise from the higher standards of comfort and convenience and the faster schedules to which today's passenger-train operation must adhere. There are also plenty of them associated with building up and maintaining an adequate supply of freight cars capable of moving the traffic safely and satisfactorily.

3. More than ever before intense operations under war conditions threw into striking relief the strategic importance of men in supervisory positions in building morale and securing greater efficiency from the forces under their direction. Incidentally, the same thing was true of all industry. If the railroads are successfully to meet the severe competition with which they are now threatened, every possible effort should be made to secure and maintain a high degree of morale and efficient operation. What can be done better to equip and strengthen the hands of men in supervisory positions to enable them to function more effectively?

Reducing Diesel Lubrication Costs

An article appearing in this month's feature pages describes and evaluates several methods of prolonging the useful life of lubricating oil. Here is a subject worthy of serious study, and one that becomes increasingly important as more and more railroads acquire additional Diesel power. As a road's Diesel fleet increases, throwing away several hundred dollars worth of lubricating oil at each change becomes a sizable financial burden. Lubrication accounts for a noticeable portion, often more than a quarter, of the total maintenance cost of a Diesel locomotive. A glance at figures from several representative railroads operating comparatively new Diesel power indicates a lubrication cost of at least ¾ cent per mile per thousand horsepower. This would amount to well over a thousand dollars per month for a 6,000-hp. locomotive operating 25,000 miles a month.

One method by which this expenditure may be reduced is to reclaim the used lubricating oil drained at each change. This may be done by the individual road concerned where the amount of Diesel power operated is sufficiently large to justify the expense of installing its own reclamation plant. Or it may be done on contract basis where the total amount of oil to be reclaimed is limited. With either procedure there should be a resultant substantial saving over the cost of using all new oil.

The main disadvantages to the use of this process from the railroads' standpoint do not appear to be of great consequence nor of sufficient importance to outweigh the monetary savings that can be realized through reclamation. The facts that reclaimed oil is not entirely equivalent to new oil and that the process removes additives from the oil do not seem seriously disadvantageous. They may, however, limit the proportion of used oil that can be used in relation to the total volume of oil. But even if the quantity of reclaimed oil, as is the present practice on many roads, is restricted to that required for make-up purposes, appreciable savings can still be attained. Such a procedure should result in a mixture of oil with sufficiently good lubrication and detergent qualities to be satisfactory for most purposes, and at the same time effect substantial operating economies.

NEW BOOKS

PRINCIPLES OF DIRECT CURRENT ELECTRIC TRACTION —*By Douglas W. Hinde and Herbert E. Ingham. Published by George Newnes Limited, London, England. 248 pages, 5¾ in. by 8¾ in. Illustrated. Price 15 shillings.*

The book is written for street railway, trolley-bus and railway engineers, and for all students of electric traction. It does not pretend to go into the details of shop maintenance and servicing, but it does, effectively and simply, describe the principles of direct current and electric traction and gives the reader comprehensive information on d.c. electric traction equipment as it has been developed in English practice. Subjects covered are: Traction Motors; The Control of Tramway and Trolley-Bus Motors; The Control of Railway Motors; Braking and Auxiliaries; Power Supply and Collection; Rolling Stock; Diesel-Electric Traction; Testing and Maintenance; Metadyne Traction Equipment.

NATIONAL FIRE CODES, *Vol. V, National Electrical Code, 1947 Edition. Published by the National Fire Protection Association, 60 Batterymarch Street, Boston, Mass. 408 pages, 6 in. by 9 in. Price, $2.00.*

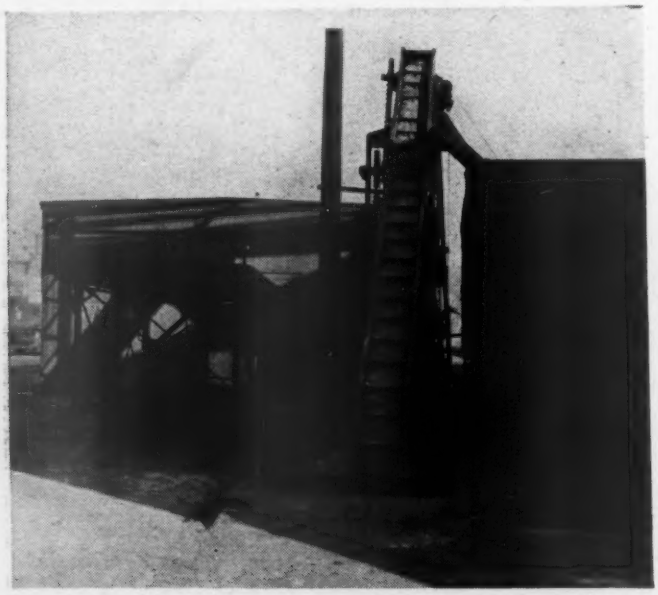
The 1947 NFPA edition of the National Electrical Code is a collection of rules governing the installation, and to a certain extent, the use of electrical equipment. Its purpose is to reduce the hazard from electrical fires and electrical accidents and it does this by specifying the exact manner in which electrical materials, devices, fittings and appliances shall be both originally installed and later maintained. A strict compliance with the National Electrical Code will produce an electrical installation which may be deemed reasonably safe from electrical fires or accidents. Without a doubt, there is no similar instrument in existence which can even approach the application of the NFPA National Electrical Code. It contains examples, an index of all NFPA publications relating to various sections of the Code, and an advertising section of "approved" products.

IN THE BACK SHOP AND ENGINEHOUSE

Waste Material Conveyor

The problem of waste disposal is made easier at the Communipaw enginehouse of the Jersey Central by the use of an inclined conveyor that eliminates the need for manpower to hoist ashes and other trash from ground level into hopper cars.

The material to be disposed of is hauled from the enginehouse in two-wheel carts and dumped into the base of the conveyor. The conveyor, which is at an angle of approximately 30 deg. with the horizontal, is set in motion by a push button located on one of the supports at the high end and carries the trash on a steel-cleated belt to a level slightly above the top of the hopper car. From here the disposable material is dumped into a chute which guides it into the car. When one section of the car is filled, it is moved by means of a pinch bar and loading continued until the entire car is full.



The conveyor hoists trash from the ground and drops it through a chute into the hopper car

Disposable material that has just been dumped from the cart traveling up the steel-cleated conveyor belt

The conveyor was constructed of scrap materials by the railroad's forces. It is powered by an electrical motor of approximately 5 hp. which drives the cleated belt at the desired speed through a double-reduction chain system.

Questions and Answers On Locomotive Practice

By George M. Davies

(This column will answer the questions of our readers on any phase of locomotive construction, shop repairs, or terminal handling, except those pertaining to the boiler. Questions should bear the name and address of the writer, whose identity will not be disclosed without permission to do so.)

Cylinder Clearance

Q.—Is the distance between the front of the piston and the inside of the cylinder head, the piston clearance or the cylinder clearance?—R. A. R.

A.—The distance between the front of the piston and the inside of the cylinder head, could be considered both as piston clearance and cylinder clearance although one deals with the actual distance between the two parts and the other with the volume or space. Cylinder clearance is the space between a piston, when at either extreme position, its nearest cylinder head and the valve. It includes all space bounded by these members. It is measured by volume and is designated by its percentage to the total cylinder volume displaced by one piston stroke. To illustrate: Eight per cent cylinder clearance means eight per cent of the sum obtained by multiplying the area of a piston by its stroke.

The piston clearance is the distance between a piston, when at either end of its stroke and its striking position against its nearest cylinder head.

Laying Out Aluminum-Alloy Tank Plates

Q.—Our practice in making seams for steel tank construction is to make the distance from the center of the rivet hole to the edge of the plate one and one-half times the rivet hole diameter. Would this same proportion hold true for seams of tanks made with aluminum-alloy plates?—M. E. A.

A.—For aluminum construction the edge distance measured from the center of the rivet hole in the direction of stressing is made equal to, or greater than, twice the diameter of the rivet hole. The ultimate bearing strength of aluminum alloys in contact with driven rivets is about 1.8 times the nominal tensile strength of the metal, provided that the edge distance in the direction of stressing is equal to at least twice the diameter of the hole as measured from the center of the hole. For smaller edge distances the bearing strength drops off about in proportion to the decrease in edge distance, so that for

an edge distance of one and one-half diameters the bearing strength is about three-quarters of that for an edge distance of two diameters.

Aside from considerations of strength, the edge distance for aluminum construction is important because of the possibility of bulging the edge of the plate and causing an unsightly finished joint. Such bulging may be avoided by maintaining an edge distance of at least one and one-half times the diameter of the rivet and being careful to avoid over-driven rivets. When edge distances of less than one and one-half diameters are used, the rivets generally must be underdriven to avoid bulging the plate.

Oil-Line Checks

Q.—Are checks required in all oil lines between the mechanical lubricator and the part to be lubricated; if not, what determines whether or not a check is required?—F. L. C.

A.—It is the general practice to use a check in the oil line between the mechanical lubricator and the part to be lubricated. When supplying oil to the steam chest, cylinders or to any auxiliary steam pipe such as the air pump or stoker, it is customary to apply terminal checks in the line.

These terminal checks are generally either the spring-loaded or diaphragm types and are applied to prevent the steam from entering the oil lines and working back into the lubricator. The spring type is set to a tension about 15 to 25 pounds higher than the working boiler pressure so that the oil line is closed against the steam pressure at all times, except when the lubricator is working, at which time the lubricator pumps the oil to a pressure sufficient to overcome the spring or diaphragm pressure in the terminal check and allows the oil to pass into the steam chest, cylinders or steam pipe as the case may be.

When supplying oil to the guides or any point where the oil is not working against pressure or steam, the general practice is to apply a check in the line to prevent the oil from draining out of the pipe, thus keeping the line filled with oil at all times. A spring-loaded ball check with sufficient pressure on the spring to keep the ball seated is all that is required.

Welding Sleeves for Locomotive Pipe Lines

Q.—We have been fabricating the piping on our Mikado-type locomotives using welded fittings wherever possible. It had been suggested that the pipes be butt welded at the joints and the joints protected by welding sleeves. Is this necessary for locomotive work?—F. I. D.

A.—Welding sleeves are used for reinforcing butt welds in pipe lines. They relieve the weld of any bending stress and much of the tensile stress to which it would otherwise be subjected, leaving it free to maintain tightness. The sleeves are made in two halves, longitudinally, the longitudinal seams being beveled so that they can be welded together easily. To assure a snug fit around the pipe, each half is made slightly less than a semi-circle. A large transverse recess at the center of each welding sleeve provides more than ample space for the conventional type of butt weld such as is ordinarily made between two lengths of pipe.

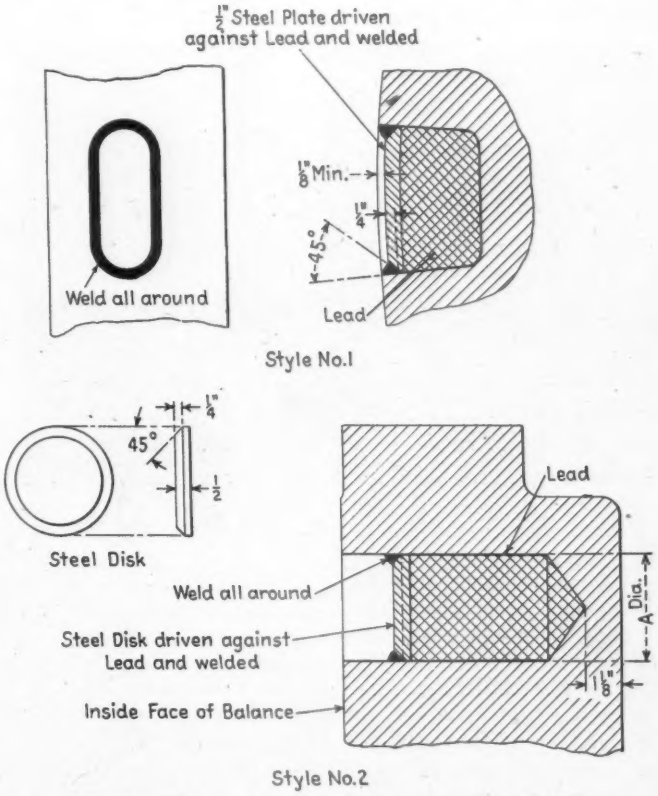
Welding sleeves are generally used where long lengths of pipe are run for a considerable distance and are supported on hangers or brackets with a large span; thus it is important that precaution is taken to protect the butt weld joining the lengths of pipe together. On locomotives where a long run of straight pipe is exceptional and where all pipes are amply supported at short intervals there should be no need for the use of welding sleeves.

Counterbalancing Weights

Q.—What methods are employed for applying lead to the counterbalance of locomotive driving wheels? We apply lead in rim pockets, which requires the removal of the tires when adjusting the balance.—R. S. A.

A.—The application of lead to pockets in the rim of the wheel is the general practice. Counterbalancing is done in the back shop at which time most locomotives get new tires. Generally the checking of the counterbalance need not be made until the tires are removed; where it is necessary to recheck the counterbalance on account of rod changes, etc., the removal of the tires eliminates the possibility of any variation in the tires effecting the counterbalance weight.

The illustration shows typical methods of applying lead to the rim and also to the back of the counterbalance



Two methods of applying lead for counterbalancing

in cases where no pockets are provided in the rim. Style No. 1 shows the methodof applying lead to core pockets in the rim of a wheel center. The application of the ¼-in. steel plate over the lead protects the lead from being lost when applying new tires. Style No. 2 shows a method of applying lead in counterbalance holes in the back of the counterbalance. This method simplifies the balancing of the wheels and does not require tire removal, but in all cases the tires should be turned before balancing the wheels.

Manual Bell Ringing

Q.—Do locomotives equipped with air-operated bells also have to have means of manual operation?—F. J. M.

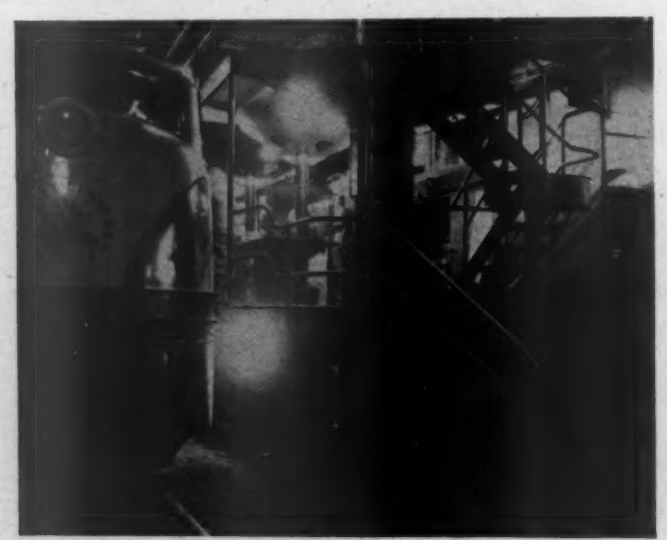
A.—Although many air-operated bell ringers that are applied permit the use of, or work in conjunction with a bell rope, it is not required that they should be equipped for manual operation. In fact where bells are located on the front bumper and under the pilot as on many of the streamlined locomotives, manual operation of the bell would be impracticable.

Diesel Locomotive Servicing Facilities

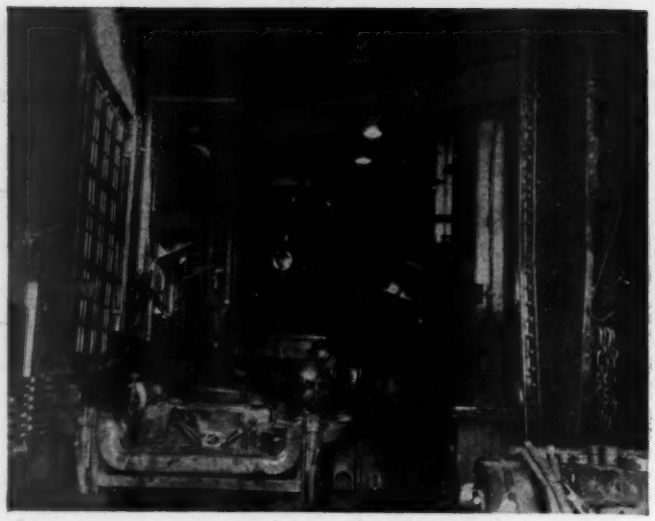
The section of the Jersey Central's Communipaw enginehouse for maintaining Diesel-electric locomotives comprises the necessary facilities for performing all classes of repairs to the Diesel engines, trucks and electrical equipment with the exception of removing the entire engine. It includes a two-level platform for servicing and repairing this power on the two tracks inside this section. The platforms are made of ¼-in. diamond-tread sheet iron supported by suitable I-beams and are located at heights that are most convenient for working on the various types of Diesel locomotives handled in this shop. Drop aprons of similar sheet iron are installed to span the gap between the upper platform and the top of the locomotive. The space below the bottom platform is utilized to house a group of lockers for storing tools and materials.

A road locomotive and a switcher in the Diesel repair shop

A one-ton monorail crane is installed over the center of the track occupied by the switching locomotive shown in one of the illustrations. The rail of this crane extends lengthwise for moving the hoist along the pit. The hoist is moved and operated by hand from the top of the locomotive and it is used for removing heavy parts from the Diesel engine, such as cylinder heads and pistons and rods. A one-ton, 20-ft.-radius jib crane, also hand-operated and reached from the upper level, is located at one end of the platform. This crane can be swung over either track and it is used to handle work from the monorail crane to the bench or the platform.



The stairway at the rear of platform leading to the upper level of the Diesel servicing platform assembly



A jib crane is used for truck work

Trucks are removed by hoisting one end of the locomotive, using a locomotive crane and a spreader cable. The trucks are then pulled out and delivered to the Diesel shop where the necessary work is performed with the aid of a five-ton jib crane of 20-ft. radius installed at ground level between the two tracks and near the doors.

There are two benches for working on pistons and rods. The bench on the lower platform is 48 in. by 60 in. and has horizontal, U-shaped extensions. The skirt of the piston is slid over one of these extensions, which form a support for the piston that enables work to be done on its exterior. The second bench is on the upper platform and has an outside contour that is generally circular approximately 48 in. in diameter, but which has U-shaped sections removed from it. The piston-and-rod assembly is set down with the skirt resting on this table and the rod hanging through the opening from which the section was removed. Valve maintenance is also performed on the upper level on a valve grinding machine located thereon.

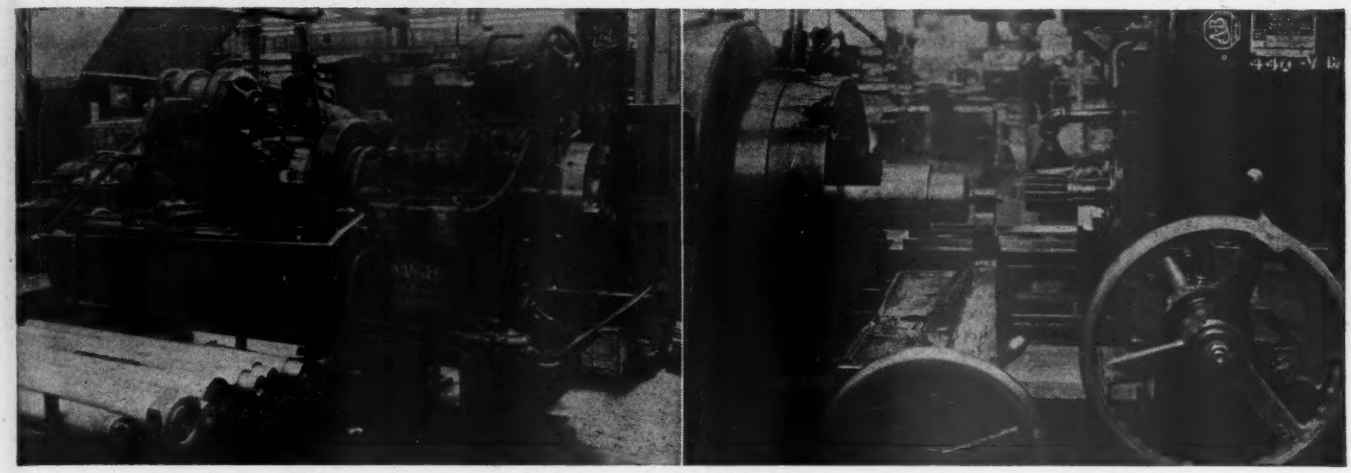
The Central Railroad of New Jersey is also contemplating the erection of a large Diesel shop for servicing the ten 4,500 hp. Diesel-electric road freight locomotives that are now on order.

Thread Milling On Locomotive Parts

The illustration shows a thread-milling machine, made by the Smalley-General Company, Bay City, Mich., which is installed at the Paducah, Ky., locomotive shop of the Illinois Central.

The particular work now being done on this machine consists of milling the threads on piston rods, knuckle pins, crank pins, large nuts, etc. The importance of uniform, accurately sized threads for these parts can hardly be over-emphasized and, as compared with cutting these threads with a single-point tool in an engine lathe, the Smalley machine gives greatly increased production and thread accuracy within a tolerance of about .001 in.

The machine may be used for cutting internal as well as external threads and is particularly advantageous for this operation. In milling the 5½-in. thread in a large piston-rod nut, for example, the time required for this operation is reduced at least 50 per cent by use of the thread-milling



Smalley-General thread milling machine in use at Paducah locomotive shops of the I. C. (left)—The piston rod set up ready to cut a thread on the end (right)

machine. Dial micrometer adjustment permits quickly and accurately setting the milling cutter to give the desired thread size. All thread milling work at Paducah shops is done on this machine, the size range normally used being covered by a group of 14 cutters.

Air Brake Questions and Answers

The 24 RL Brake Equipment for Diesel-Electric Locomotives—Parts of the Equipment—Locomotive A Unit

(Note:—The figure numbers and part numbers appearing in the questions and answers refer to the Westinghouse Air Brake Company's Instruction Pamphlet No. 5066-1, issue of February, 1946—EDITOR)

489—Q.—Why are the adapter 11 and strainer used? A.—The adapter *11* and strainer *10* provide a large capacity pipe connection and a replaceable screen for keeping scale and other foreign particles from the valve seat.

490—Q.—What is maximum or opening pressure and how is the adjustment made? A.—To adjust the safety valve for the maximum, or opening, pressure, which in this case is 150 lb., remove the cap nut *3* and screw down or back off the regulating nut *7*, as may be required, after which replace the cap nut.

491—Q.—What is the minimum or closing pressure and how is the adjustment made? A.—The minimum or closing pressure for the safety valve is approximately 10 lb. less than the cut out pressure, and can be adjusted by changing the size of the ports *f*, using regulating nut *8* for the purpose. After the adjustment is made, screw down the jam nut *9*.

492—Q.—Describe the DS-24-H brake valve Fig. 1-7 and 8. A.—The DS-24-H brake valve is furnished with a pipe bracket on which are mounted the various brake valve portions. Four studs *28* (Fig. 8) in the bottom of the filling piece portion are used to secure the filling piece to the pipe bracket, and four studs *27* in the top of the filling piece portion are used for securing the application portion, rotary valve seat portion and brake valve body portion to the filling piece.

493—Q.—Where are the pipe fittings located? A.—All the pipe connections are made to the pipe bracket face, beneath the floor sheet, by means of Wabcotite fittings. This arrangement provides a compact brake valve installation that occupies a minimum of space and eliminates much of the air piping in the cab.

494—Q.—Name the various portions that make up the DS-24 brake valve. A.—Brake valve body; rotary valve seat portion; service application portion; train control and safety control cock; filling piece portion; double heading cock; first service cock; equalizing piston portion; pipe bracket and D-24-A feed valve.

495—Q.—Describe the pipe connections. A—The pipe connections to the pipe bracket are designated numerically and so marked on the bracket, (Fig. 8—Pipe Bracket—Bottom View). *1* brake pipe; *3* safety control pipe; *5* equalizing reservoir; *8* stop reservoir exhaust (plugged); *9* sanding pipe; *10* brake application valve piston; *11* master controller straight-air pipe (plugged); *12* maintenance in emergency (plugged); *17* equalizing piston exhaust for suppression timing (plugged); *18* second reduction reservoir; *19* suppression reservoir (plugged); *21* feed valve (plugged); *23* first snppression reservoir; *24* reduction limiting reservoir; *25* power control switch pipe; *26* temporary suppression (plugged); *29* governor; *30* main reservoir; *38* straight air (plugged); *39* application relay switch (plugged); *40* release pipe (plugged).

496—Q.—Describe the brake valve portion. A.—The brake valve body is attached to the rotary valve seat portion *225*, (Fig. 8). The automatic brakes are controlled by handle *370*, which has six positions, shown in Fig. 8. The movement of the handle is transmitted through the rotary key *257* to the rotary valve *216* which is thereby rotated to establish port connections according to its position.

497—Q.—Name the six brake handle positions. A.—the six brake valve handle positions are, from left to right: Release, Running, First Service, Lap, Service and Emergency.

498—Q.—What serves to locate the brake valve handle in its various positions? A.—Quadrant *247* keyed to rotary valve key shaft *257* provides the notches into which quadrant latch *259* moves for locating the brake valve handle in its various positions. The quadrant is rotated to locate and hold brake valve handle in position.

499—Q.—How is manual sanding accomplished? A.—Manual sanding is accomplished by depressing the handle *370* upon the sanding bail *355*, which unseats sanding valve *279* (Section *G-G*) through plunger *282* permitting main reservoir air to flow to the sanding pipe. Choke *201*, (Section *A-A*) provides a warning port and also a timed release of sanding pipe air after spring *280*,

(Section *G-G*) seats valve *279*. Sanding stop spring *284* cushions the handle pressure on the sanding bail when sanding and returns the handle.

500—Q.—Describe the manner in which an emergency brake application is initiated. A.—Emergency pilot valve *243*, (Section *A-A*) is held seated by spring *244* and emergency valve *241* by spring *245* at all times except when the brake valve handle is moved to emergency. In emergency, the drive shaft housing contacts plunger *240* and unseats the pilot valve *243*. This exhausts the air in the spring chamber of emergency valve *241* faster than it can enter through choke *202* partially unloading the large valve and permits the brake valve movement to unseat the emergency valve with greater ease and to vent the brake pipe air to atmosphere, thus initiating an emergency brake application.

501—Q.—Can the brake valve handle be inserted or removed in any position? A.—The brake valve handle *370* can be inserted or removed only in Running position.

502—Q.—Explain how the movement is transmitted to the rotary valve. A.—The handle is inserted in the slot in the drive shaft housing *274* and pushed forward until the curved lip slips beneath the cam roller *276*. This latches the handle *370* to the drive shaft housing *274*, to which a keyway is pinned by pin *b*. The end of the rotary valve key *257* is keyed to fit into the keyway, so that as the handle *270* is rotated the movement is transmitted through the drive shaft housing, *274*, pin *b* to the rotary valve key *257* and rotary valve *216*.

503—Q.—How is the lubrication of drive shaft housing supplied? A.—Lubrication of the drive shaft housing *274* is supplied through oil ball valve *226* and oil holes in the bushing around the housing.

504—Q.—Explain in detail how warning is consummated preceding a safety control application. A.—plunger spring *287* acts upward on plunger *288* and roller *371*, so that handle *370* is tilted upward when not held down, and through pusher *289* unseats check valve *351*. This permits safety control pipe air to flow through a choke in the passage to the whistle valve *602* at a restricted rate to sound a warning.

505—Q.—What happens if the brake valve handle is not depressed immediately? A.—A safety control application is initiated.

506—Q.—How is the warning stopped? A.—When the handle is held down the force of spring *287* is nullified, permitting the lighter spring *352* to seat valve *351*, closing the safety control pipe to the whistle exhaust.

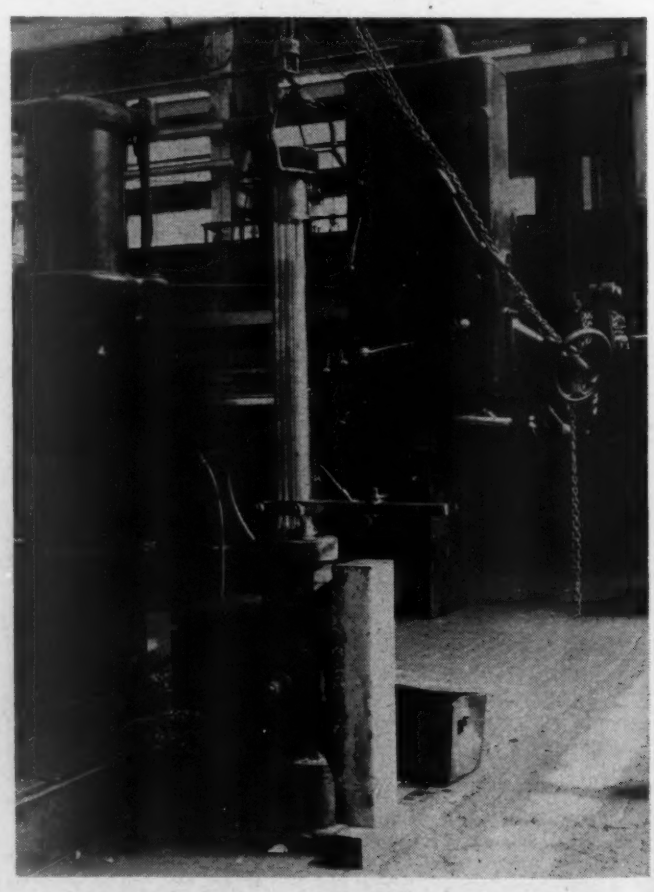
Lapping Operations At Paducah Shops

Two unusually interesting lapping operations now being performed at the Paducah, Ill., locomotive shops of the Illinois Central are shown in the illustrations. In the first view, a partially machined, new multiple-bearing crosshead is shown bolted to the angle-table of a Cincinnati-Bickford radial drill with a new piston rod inserted vertically in the crosshead taper fit. Arrangements are made for partially revolving the piston rod back and forth in the fit by means of the wood handle which is bolted around the piston rod on one end and connected through a short lever arm and crank to the radial drill spindle. The throw of this crank is 5 in. and turning of the drill spindle therefore moves the handle 5 in. back and forth, thus performing mechanically by power an operation formerly done by hand.

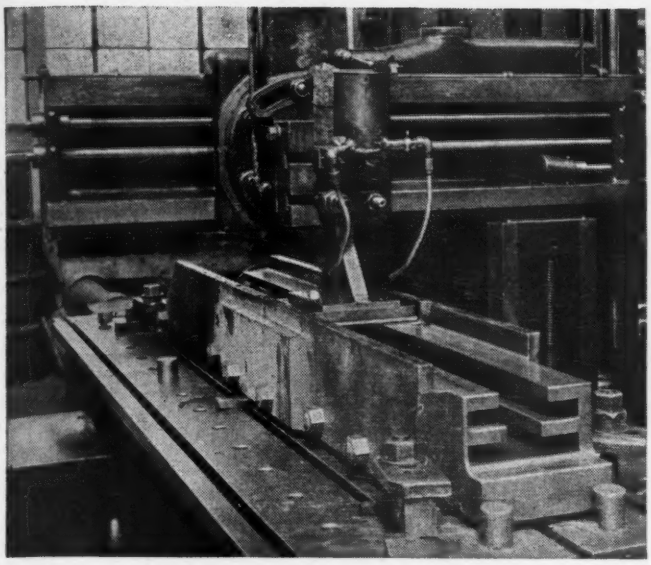
A lapping or grinding compound is of course inserted between the piston rod end and the crosshead fit and provision is made for controlling the pressure and also lifting the piston rod out of the crosshead when necessary for inspection by means of a one-half ton electric hoist and sling connection to the large nut on the upper end of the piston rod. About 30 min. is required for this grinding operation which assures an accurate fit of the piston rod in the crosshead.

Multiple-bearing crosshead guides are not subject to especially rapid wear in service and sometimes make up to 600,000 miles of service before requiring attention. Eventually, however, wear develops and occasional cases of scoring occur. To recondition such multiple-bearing guides without the necessity of machining them, the special lapping plate and equipment shown in the second illustration is used in connection with a Rockford 36-in. open side hydraulic-drive planer. The guide is bolted to the planer table with hold-down clamps in the usual manner, as illustrated. The lapping plate is a double-plate construction, 8¾ in. wide by 8½ in. long, the two plates being designed to clamp between them the edges of an abrasive sheet which extends under the lower plate and rests on the crosshead bearing ledges. The two plates are held together by Allen head screws and attached by a welded brace and two stiffeners to the planer tool post. A small oil container with two shut-off cocks and small copper-pipe connections permits oil to drip on both ledges of the guide during the lapping operation. Pressure is applied by means of the vertical planer feed and the amount used depends upon the weight and kind of abrasive paper which may vary from No. 40 and 60 to No. 80 for finishing.

For reconditioning slightly worn guides this lapping operation may be used to remove from .002 to .003 in., more wear than that generally requiring remachining. In the case of scored guides, if the removal of .005 in. of



Power lapping a piston-rod crosshead fit on a radial drill



Lapping a multiple-bearing crosshead guide on an open-side planer

material will clear up most of the scratches this may be done and the guides returned to service. New guides are also lapped on this machine to remove tool marks with attendant assurance of smooth operation without heating even when the locomotive is just out of the shop.

Locomotive Boiler Questions and Answers

By George M. Davies

(This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.)

Throat Sheet Lagging

Q.—We have 15 Pacific-type locomotives which are lagged and jacketed around the throat sheet, while none of our Mikado type are so equipped. Is the application of lagging and jacket to the throat sheet of a locomotive boiler of any particular benefit?—F. L. D.

A.—The application of lagging and jacket to the throat sheet of a locomotive can be considered added protection against cracked throat sheets. The throat sheet of a locomotive boiler is perhaps the most susceptible part of the boiler to cracking due to its construction and location in relation to the rest of the locomotive. The forces due to expansion and contraction have their greatest effect at the throat sheet and for this reason any means of reducing the possibility of temperature changes in the throat sheet, such as the application of lagging and jacket, could be considered a benefit.

Thermic Syphons

Q.—We have several engines of one class equipped with Thermic Syphons. What special attention, if any, should be given the boilers of these engines, other than is given to the boilers of engines not equipped with syphons?—F. E. M.

A.—The principal thing required in maintaining thermic syphons is the systematic washing of the syphons to see that they are kept perfectly clean. Not much trouble will be experienced with the diaphragm plate if flexible staybolts are properly applied around it. If the rules outlined by the manufacturer of the thermic syphon are followed, little trouble will be experienced. These call for the interiors of syphons and the bottom of the exterior to be washed and cleaned at each washout. In very bad water districts and where a sand blast machine is in use the water side of the diaphragm plate at the roll of the flange must be sand blasted about every ninety days with an air pressure on the sand blast machine not over 40 pounds. This is to remove any scale that might accumulate at that point. It is very essential to keep the sheet clean, or the working of the sheet at this point if not protected will perhaps change the structure of the material. This is the cause of the sheet cracking. After the sheet has been sand blasted, air pressure should be used to clean the space between the diaphragm flange and the neck of the syphon so that at all times there will be water at this point when there is fire in the firebox.

Impurities in Boiler Steel

Q.—The A. S. M. E. Code shows the amount of phosphorus in boiler sheets to be not over 0.04 per cent and the amount of sulphur not over 0.05 per cent. Will you please advise what effect a higher percentage of phosphorus would have on the sheets and what effect on the sheets a higher percentage of sulphur would have?—F. M. R.

A.—Phosphorus enhances the strength of steel. It also adds to the hardness of the plate and thus makes it better able to resist abrasion. However, these qualities are better secured through the medium of carbon, because phosphorus tends to make the material brittle. Steel containing much phosphorus is particularly weak against shocks and vibratory strains. On this account it may be considered the most harmful impurity which occurs in steel boiler plates. Sulphur increases the brittleness of steel while hot, causing red-shortness, or a tendency of the steel to crumble while being rolled. It also interferes seriously with the shaping and forging of the material during the fabricating process.

Caustic Embrittlement

Q.—What is "Caustic Embrittlement?" What are the physical defects that indicate caustic embrittlement in the plates of a boiler and how can they be detected?—D. O.

A.—The term "Caustic Embrittlement" is really a misnomer. The steel does not become brittle in the way that glass or cast iron is brittle. It remains ductile, but is fissured through the grain boundaries. Attention was first of all drawn to this matter through the failure of vessels used in the manufacture of caustic soda, and these failures were attributed to embrittlement due to caustic. This term has passed into the literature on the subject, but it may be more accurately referred to as intercrystalline fracturing due to chemical action.

The physical defects noted in boilers attacked by caustic embrittlement are characteristic and well defined, and for all practical purposes are independent of the quality of steel employed in their construction. They are:

1—The cracking is confined to the riveted seams. The plates away from the seams are unaffected. Joints above and below the water level are equally liable to this form of cracking.

2—The cracking begins at rivet holes and on the surfaces in contact, not at the outside surfaces.

3—The cracking of the plates is usually accompanied by the breaking off or cracking of the rivet heads, and this is usually the first observable symptom.

4—The path of the cracks is along the grain boundaries and not trans-crystalline as with fatigue failure.

At the first sign of caustic embrittlement, usually the breaking off or cracking of the rivet heads, the area should be magnafluxed to determine the extent of the damage to the plates.

With the Car Foremen and Inspectors

Construction of Welded Freight Cars*

By R. L. Rex†

Welding operations employed by the Milwaukee in the mass production of all-welded gondolas and some comments on the use of low-alloy high-strength steels

IN the reconstruction program, which has already been started, the possibilities of utilizing welding and allied processes in the fabrication of new freight cars and other sorely needed replacement items are being given extensive and thoughtful consideration. In this connection, it may be noted that more than 30 per cent of existing freight cars are over 25 years old and, taking this figure into account and relating it to normal replacement schedules, expected service demands and other factors, it has been variously estimated that approximately 1,000,000 new freight cars, including both home-built and purchased, will be acquired during the next 10 years.

Weight Reduction Possibilities

The trend toward lightweight car construction which began some years before the war has been considerably accentuated because of new demands for speed and capacity. Although aluminum alloys and stainless steels have been used to some extent in building lightweight freight cars, the group of alloys commonly referred to as low-alloy high-strength steels have thus for enjoyed the most extensive use.

The over-all weight reduction resulting from the combined use of such steels and all-welded construction may, depending upon the type of car, range between five to seven tons. This reduction can be translated into one or more of at least three important advantages: (1) greater car capacity without increasing total load to be hauled; (2) less cars needed for a given amount of freight; or (3) less fuel expended in hauling a given length of train. In any combination, such advantages mean greater operating revenue.

In welding these steels, as in welding other alloy materials, the proper selection of filler metal is a matter of paramount importance. In general, when plain-carbon filler metal is applied to a steel containing alloying elements, a certain flowing or migration of these elements from the base metal into the deposited metal occurs as the two are melted and mixed together under the heat of fusion and this migration tends to produce in the deposited metal properties differing considerably from those which would be obtained if the same filler metal were applied to

* Abstract of paper presented before a session of the Railroad Division, American Welding Society, during the annual meeting at Atlantic City, N. J., on November 18, 1946.

† Railroad mechanical specialist, Air Reduction Sales Company, New York.

Fig. 1—The assembly line in the C. M. St. P. & P. shop fabricating welded freight cars

a plain-carbon steel. Owing to a difference in ratio of deposited metal to total melted metal when different thicknesses of section are welded, the rate of alloying element migration, in general, approaches the maximum in single-bead thin-section welds and approaches the minimum in multiple-bead heavy-section welds. Except in cases where the base metal contains excessive amounts of certain harmful elements, such as phosphorus, the results of this migration are, for the most part, beneficial. However, certain other exceptions apply depending on the welding conditions and the process used; therefore, it is wise to check the recommendations of the steel producer and the manufacturer of the filler metal before applying this principle.

Car builders are taking advantage of this principle by using plain-carbon filler metal wherever the migration effect is known to produce the desired properties and by resorting to the more expensive special or alloy filler metals only in the relatively few cases where higher strength or other special properties not obtainable with the plain-carbon filler metal are desired.

Distortion Control

The subject of distortion control warrants careful consideration in welding the low-alloy high-strength steels owing to the relatively thin sections generally encountered when such steels are used. This is particularly so in welding car roof and side sheets because any distortion in such members is distinctly more noticeable in welded construction than in riveted construction where uniform rows of rivets tend to draw the eye to themselves and to the smaller intervening areas, thus camouflaging the overall uneven contour. Even if considerations of eye appeal are dismissed on the grounds that a freight car is essentially a utility and not a work of art, the fact remains that stresses inherent in distortion may cause cracks in service and this possibility cannot safely be disregarded. Car builders realizing this have given distortion control the attention it deserves and, as a consequence, have developed a number of successful methods by which it or its effects can be minimized. Some of these methods involve changes in design, some involve changes in technique and some involve both.

Changes involving design include using lap joints in certain connections requiring special reinforcement not provided by the usual butt-welded joints; heavier or additional stiffening members; and crimped or corrugated sheets instead of plain flat sheets. Changes involving technique include using wandering or skip weld sequence; additional or heavier weight cooling bars, clamps and positioners; and prestressing to introduce reverse camber.

Prestressing has, in general, proved to be the most practical and, for the most part, is performed when the parts are placed in the various jigs and positioners preparatory to initial assembly.

Mass Production of All-Welded Cars

In order to illustrate the extent to which mass production methods are being applied to all-welded car construction, actual step-by-step assembly-line operations in a car fabricating shop of the Chicago, Milwaukee, St. Paul & Pacific, Fig. 1, are described and illustrated.

In setting up this shop careful thought has been given to layout and scheduling so that all things contributing to the finished product are caused to move steadily forward to the place of final assembly and to arrive there on time. The shop layout provides two main assembly lines each connecting to a number of subassembly feeder lines. Serving the two main lines are a group of five parallel

Fig. 2—Welding the center sill in a jig

Fig. 3—The cross-bearers are held in a combination jig positioner

Fig. 4—A revolving positioner is also used in welding the drop doors

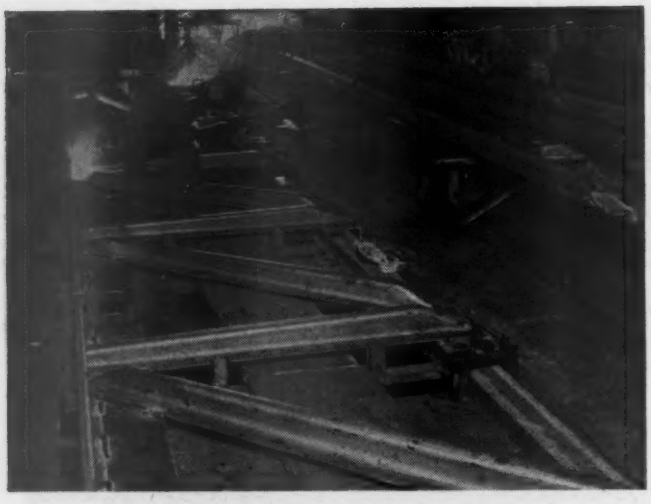


Fig. 5—The gondola side frames are aligned and clamped in a jig

Fig. 6—A table-height jig permits flat position welding of the drop ends

standard gage tracks and an interconnecting system of strategically located supplementary tracks and switches. As the car is being erected, it moves along from one specialized position to the next with time allowed for distribution of materials and men and eventually reaches one of the five parallel tracks where final erection, finishing and inspection operations are performed after which it rolls out to take its place among other cars in service.

The center sill, Fig. 2, is the main subassembly component of the underframe assembly and is what may be regarded as the backbone of the car. In fabricating this item, holes are cut into standard A.A.R. Z26 Z-bar sections, using a hand cutting torch. The sections, held in a specially designed jig, are then welded together. Following this operation, the center filler, head blocks, draft gears, couplers, brake cylinders, brake rods and slack adjusters, are added. At this assembly station, the center sill is welded only on its bottom side. The top side is welded later after the center sill has been combined with other components of the underframe assembly.

Also included among the subassembly components of the underframe assembly are the cross-bearers, Fig. 3. The plates used in fabricating these items are standard mill plates $\frac{3}{16}$-in. thick for the sides and $\frac{7}{16}$-in. thick for the top and bottom. During fabrication, the plates are held in proper position for welding in a revolving combination jig positioner which consists primarily of a trunnion-mounted horizontal shaft and correct alignment of the plates is assured through the use of simple saddle and wedge clamping devices. The use of jigs, fixtures and positioners and of combination jig positioners such as this is one of the outstanding developments contributing to the rapid advances in all-welded car construction.

Drop doors, Fig. 4, also subassembly components of the underframe assembly, are fabricated by welding in another type of positioner. Each drop door consists of a door base plate made of standard mill plate, stiffeners made of standard mill Z-iron and a T-shaped door lock catch. The T-shaped material out of which the catch is made consists of a split section of a standard mill I-beam either sheared at the mill or machine gas cut at the shop.

The side frames, Fig. 5, although practically major assemblies in themselves, are subassembly components of the car body or superstructure assembly. Each side frame consists of a side plate, a top reinforcing chord, a side sill and several posts and braces. The posts and braces are made of rectangular sections of standard mill plate which are either sheared to size at the mill or machine gas cut in the shop and then formed by hot punching in a hydraulic press. The top reinforcing chord is made of standard mill bulb angle. In the jig which holds these parts in alignment for welding, use is made of shop-made hold-down clamps.

Drop ends, Fig. 6, like the side frames, are subassembly components of the car body assembly. Each drop end consists of a drop-end gate, a reinforcing top angle, gussets and end sills. The drop-end gate is made of formed angle shapes. The other parts are machine gas cut to size and are bent to shape in a press. The jig is

Fig. 7—All parts of the underframe in place and ready for welding

designed to permit flat position welding, also to minimize operator fatigue by holding sections at table height.

Bolsters like the previously mentioned cross-bearers, are subassembly components of the underframe assembly and are made of standard mill products using a trunnion-mounted horizontal-shaft positioner. These and other subassemblies are fabricated in advance and are stacked at convenient points along the subassembly lines so as to be ready when the work of erecting the car begins.

Erection of the car begins when the various component subassemblies of the underframe assembly are set up for welding in the underframe jig. After setting up such items as the bolsters, cross-bearers, cross-ties, drop doors and *AB* brake valve, the center sill, shown hanging over the jig, is brought in by means of overhead traveling cranes. The center sill, Fig. 7, upon being lowered into the jig, is placed in accurate alignment with other underframe components, and the welding proceeds. In this connection, it should be noted that up to now the center sill and other underframe components have been positioned bottom side up. This has been done so as to allow, in so far as possible, the use of the flat position of welding in fabricating the bottom side of the underframe and also to permit all bottom side welding to be done before turning the assembly over for top side welding.

When all bottom side welding is completed, one of the cranes and a pair of roll-over slings are used to lift the entire underframe assembly out of the jig and turn it top side up after which the assembly is swung over one of the interconnecting tracks.

On this track are the trucks ready to meet the underframe. These items were brought to this location after being assembled elsewhere. As the underframe is lowered onto the trucks, wood blocks are inserted between the truck frames and the bolsters to provide space for the final welding of main assemblies. Then, as soon as the underframe is in position, its top side welding is completed, the air brake piping is added, and this completes the first major step in erection.

The side frames, Fig. 8, are then swung into position on the underframe. As at other assembly station, specially designed jigs are used to hold the side frames in correct alignment for welding. Next, the drop ends are welded in place after being aligned with the underframes and side frames. Other items added at this station include the hand brake bracket, floor stringer supports, pin lifter bracket, end plate and end plate hinges.

Fig. 8—Swinging the side frames into position on the underframe

Fig. 9—The final welding of the main assemblies

Fig. 10—The completed gondola rolls out of the shop ready for service

The nearly completed car, Fig. 9, then moves to the next assembly station where final welding of the main assemblies is completed. After the final welding is completed, the wood blocks which were previously inserted between the trucks and bolsters are removed. The car then moves to the next assembly station where the wood flooring and siding and the various safety appliances are added, following which the car is painted and given final inspection.

Thirty years ago, freight car parts were joined largely by means of bolts and nuts. Along came rivets, and initially their use met with opposition, but they, nevertheless, continued to be used. Then came welding and it, too, met with similar opposition but it also continued to be used and its use is being everywhere extended. Rivets continued in use only because they served the purpose better. Welding will do likewise.

Punch press adapted for multiple punching operations—From the Chicago car works

Three Shop Ideas From Pullman-Standard

The employees suggestion system now being actively encouraged and capitalized on by the Pullman-Standard Car Manufacturing Company is netting many ideas which improve safety or increase production in the several plants operated by this company. Three of these ideas were the basis for cash awards under the suggestion system and were illustrated and described in the February, 1947, supplement to "The Carbuilder," official house organ of Pullman-Standard.

The punch press shown has been adapted for multiple punching of small sheet-metal car parts by means of two special chucks as clearly shown on the machine. The bottom chuck, bolted to the table of the machine, is equipped with numerous small set screws which may be adjusted to hold as many die blocks as may be required for each particular multiple-punching operation. Punches corresponding to the number of die blocks are securely held in the chuck which is shown bolted to the top moving head of the machine, individual small set screws again being used to hold the punches. Stripping fingers hold the sheet-metal parts down while punches are retracted.

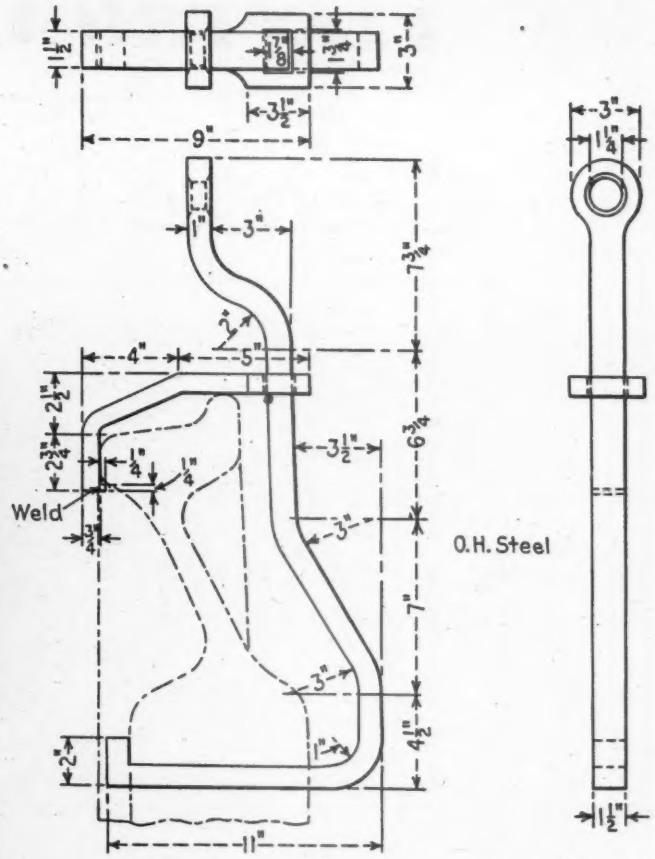
The hydraulic-press operating-valve guard consists simply of a sheet-metal frame and cover plates supported on metal strips about 8 in. above the floor and designed to enclose operating valves on a 1,000-ton press, thus avoiding any possibility of the plungers hitting workmen.

Guard for operating valves of a 1,000-ton hydraulic press—From the Michigan City shops

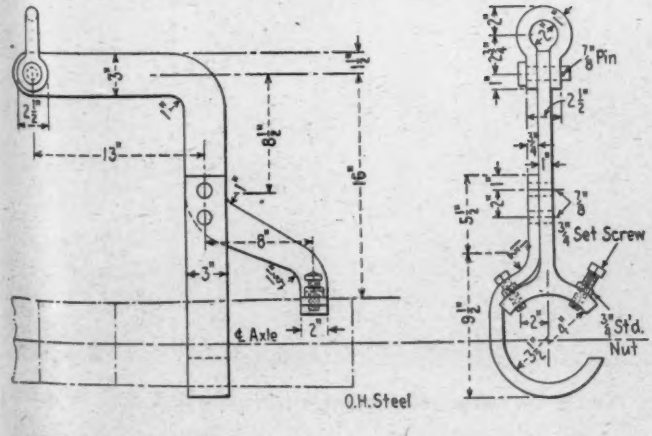
Heaters shielded for increasing the drying power of a blueprint machine—From the Chicago car works

Simply applying two sheet metal shields on top of the heaters in a blueprint machine gives the necessary additional heating capacity required to assure dry prints coming out. In other words, as the machine was originally designed, the heating units in the top radiated too much heat to permit drying the prints thoroughly. The two narrow sheet-metal shields reduce this radiation.

Wheel Shop Handling Devices



Two of the handling devices used at the Glenwood wheel shop of the Baltimore & Ohio are shown on this page. Above and at the left is shown the wheel clamp used with the cranes to pick up a wheel from a horizontal position on the roller conveyors coming from the boring mills and lift it into a vertical position. The wheel is then moved to the mounting press and placed on a wheel dolly which holds the wheel upright as it is moved onto the wheel seat on the axle. At the bottom of the page is shown the axle hook that is attached to the center of an axle when moving it with a crane in positioning the axle in one of the axle lathes and in removing it from the lathe after machining is completed. [Two other handling devices, including the wheel dolly, appeared on page 78 of the February issue. More of the devices will be described in subsequent issues—Editor.]



ELECTRICAL SECTION

Caboose Power Supply

Interior of caboose showing hand set, loudspeakers, and the electric conductor's lamp, with cover open, in the ceiling

TRAIN communication equipment will apparently find wide application, but railroad officials are at the present confronted with the selection of a dependable and economical means of power to operate the sets on the caboose. The three methods that have received the most consideration are Diesel electric generator sets, axle-driven generators with batteries, and propane engine-driven generator sets.

Preliminary trial installations have resulted in a number of advantages for the adoption of Diesel electric generator sets. Compact and economical, the small Diesel engine that drives this type of generator set will produce power continuously under nearly every condition. It operates on Diesel locomotive fuel and lubricating oil, and can be serviced by the same mechanics, although most small Diesels do not require specialized mechanics for proper servicing. In comparison with gasoline engines, the economy of the Diesel is undisputed. The fuel consumed by a Diesel is approximately one-half the amount required by a gasoline engine in developing the same horsepower.

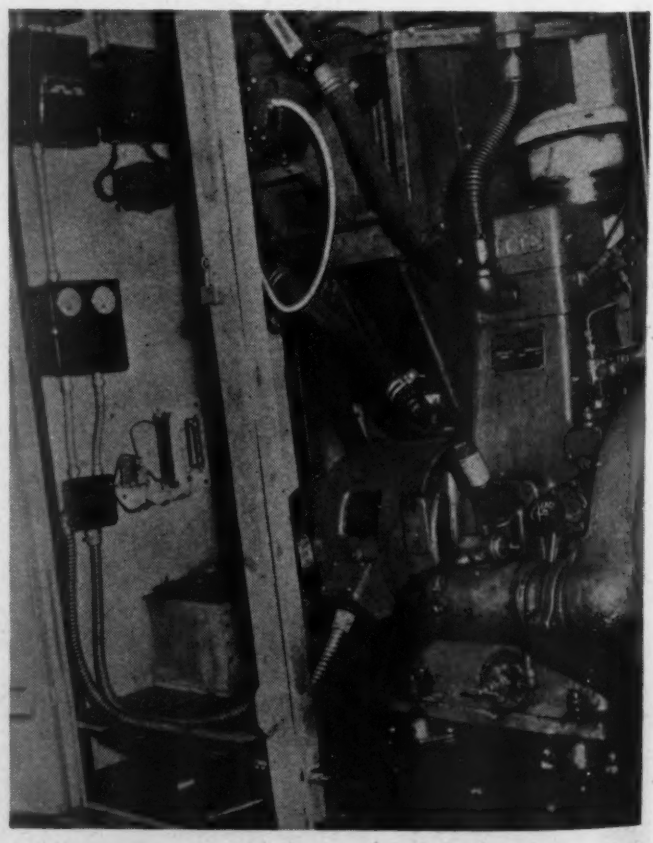
By Glenn R. Merz*

Danger of fire or explosion is eliminated through the use of Diesel-operated generator sets as the fuel required is non-explosive. The small Diesel set is often equipped with a fuel tank of about 30 gallons capacity while gasoline engine sets require bulky tanks of about twice that capacity. An additional Diesel advantage is its medium speed and continuous heavy duty capacity as contrasted against high speed engines. Many Diesels have a record of having operated for over 10,000 hours without repairs.

Apparently most economical from the standpoint of operation, but unsatisfactory in the results attained on cabooses, is the axle-driven generator. The axle generator eliminates fuel costs and danger from fire or explosion, but produces power only when the train travels above a certain speed. Voltage regulation is necessary since train speeds are not constant. Batteries, which may be damaged by freezing or sudden shock, are required for use when the train is not moving.

D. & R. G. W. Installation

Through the cooperation of the Denver and Rio Grande Western Railroad and the Witte Engine Division of Oil



The 2½ kw. engine-generator set installed in a D. & R. G. W. caboose

* Witte Engine Works, Division of Oil Well Supply Company, U. S. Steel Corporation Subsidiary, Kansas City, Mo.

Well Supply Company, a subsidiary of United States Steel Corporation, a trial installation was made of a 2.5 kw., 110-volt, 60-cycle alternating-current Witte "Diesel-electric" set. The engine was installed in a caboose and enclosed in a sound-proof cabinet. It is mounted on steel-reinforced rubber vibration dampeners, which isolate the engine vibrations from the car. An ingenious water-cooling system is used to assure proper engine cooling whether the train is moving in either direction or standing still. It employs a wall-type radiator, thermostatically controlled, with an electric motor-driven fan, mounted in a window of the caboose. Another opening, about 18 inches square, is provided for air intake. This arrangement was found to be necessary to meet the conditions of varying altitudes and temperatures. With this method of cooling it is also possible to heat the caboose by baffling the air from the radiator into the caboose.

The generator is driven by a single-cylinder, four-cycle, full Diesel engine rated 4 hp. at 1,200 r.p.m. The engine is equipped with an electric starter and may be provided with remote push-button start-and stop control, should it be desired. All wearable parts are replaceable. The 30-gallon tank mounted underneath the floor contains enough oil to operate the engine at full load for approximately 120 hours.

Between February through October, 1946, the set operated in excess of 6,000 total hours, and according to railroad officials, it has given reliable service under heavy-duty conditions including wide variations in temperature and altitude. Similar installations are on test with other railroads and have to date proven to be an efficient means of providing electric power for their caboose radio equipment and electric lights.

A. I. E. E. Discusses Transportation Subjects

Diesel-electric locomotives, Diesel-electric locomotive control, a new pantograph for high-speed current collection and silicone insulation for railway traction motors were the subjects of seven of the thirteen papers on transportation presented at the annual meeting of the American Institute of Electrical Engineers, held in New York, January 27-31, 1947. Other papers on transportation subjects were concerned with subways, street cars and trolley coaches.

Subjects and authors of the seven papers of specific interest to steam railroad men are: "3000-hp. Diesel-Electric Locomotive for the Seaboard Air Line Railway", by D. R. Staples, of the Baldwin Locomotive Works, Eddystone, Pa., and T. L. Weybrew and C. A. Atwell, both of the Westinghouse Electric Corporation, East Pittsburgh, Pa.; "Developments in Control Systems for Diesel-Electric Locomotives", by M. D. Henshaw, of the General Electric Company, Erie, Pa.; "A Power Plant Regulating System for Diesel-Electric Locomotives", by C. B. Lewis, of the General Electric Company, Erie, Pa.; "Developments in Diesel-Electric Traction-Generator Excitation Control Systems", by C. A. Brancke and G. M. Adams, both of General Electric Company, "Braking Resistors and Control for Diesel Electric Locomotives", by E. F. Weiser, of the General Electric Company, Erie, Pa.; "Developments in Current Collectors for High-Speed Service", by B. F. Langer, of the Westinghouse Electric Corporation, East Pittsburgh, Pa.; "Investigation of Silicone Insulation on High-Temperature Railway Motor", by George Grant III and T. A. Kauppi, both of the Dow-Corning Corporation, Midland, Mich., and Graham L. Moses, of the Westinghouse Electric Corporation, East Pittsburgh, Pa.

The 3,000-hp. Seaboard locomotive is a Baldwin Westinghouse unit which was described in the January 1946 issue of *Railway Mechanical Engineer*. The paper describes the electrical equipment in considerably greater detail—the engine control equipment being featured as a simple arrangement consisting essentially of a pneumatic throttle, a carbon pile type rheostat called a carbonstat, electrically connected in series with the exciter battery field, a pilot valve mounted on and operated by the governor and a metering valve.

The four papers prepared by men representing the General Electric Company are concerned primarily with control equipment for the Alco-G.E. locomotive built for the Santa Fe and described in the December 1946 issue of *Railway Mechanical Engineer*. The control was made to meet new requirements of the larger (2,000-hp.) engine and quite elaborately includes traction power, generator and motor voltage and current and engine speed within the limits of engine output and wheel slipping. It also includes temperature controls and dynamic braking controls and provides a high degree of plant protection against damage which might be caused by equipment failures. The generator control employs saturable core reactors and selenium rectifiers which reduce number of moving parts required and an amplidyne exciter to effect quick control response.

Current Collectors

The paper, "Developments in Current Collectors for High-Speed Service", by B. F. Langer, describes an experimental double-shoe pantograph which has been eminently successful in collecting current at high speeds without arcing at the point of contact. The collector shoe on older type pantographs, is mounted from pivots below the shoe. Thus both wind pressure and wire friction cause the shoe to rotate or tip back so that the leading edge of the contact shoe rides against the wire and the trailing edge drops below the wire. It is also subject to a fluttering action which contributes to arcing at the point of contact.

The new current collector has a shoe which is supported on flat springs in such a way that the shoe rotates about a point above the wire. Thus wind pressure and wire friction are made to oppose each other and the forces tending to tip or rotate the shoe are greatly reduced. A reduction of wind pressure was effected by cutting slots in the top of the collector shoe channel and holes in the flanges.

Silicone Insulation

Certain types of silicone resins used in conjunction with mica, glass and asbestos offer intriguing possibilities for insulating railway traction motors, particularly those on Diesel-electric locomotives. They will stand considerably higher temperatures than other insulating varnishes and are highly moisture resistant. The paper "Investigation of Silicone Insulation on High-Temperature Railway Motor" describes a test made on a P.C.C. street car motor which included operation for 1,675 hours at a temperature of 285 deg. C. with 46 cycles of severe humidification. Results of the test indicate the desirability of using such insulation on traction motors. Some practical problems involving the cleaning, overhaul and re-insulating of such a motor remain to be solved, but the discussion which followed the paper indicated there were no insuperable problems involved.

Section of the shop which is given over to electrical repair work

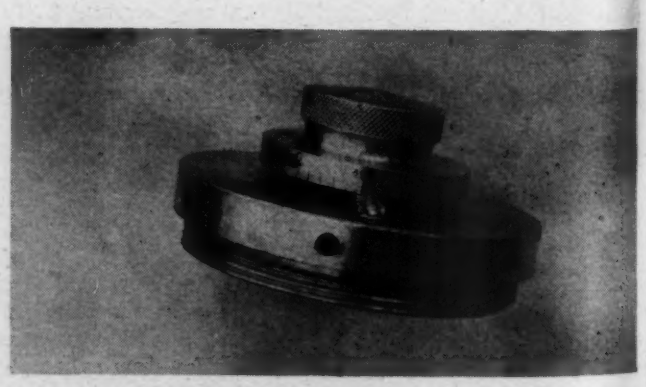
Diesel Electrical Shop

The Chicago, Burlington & Quincy has concentrated all of its electrical repair facilities for Diesel motive power at the West Burlington shops

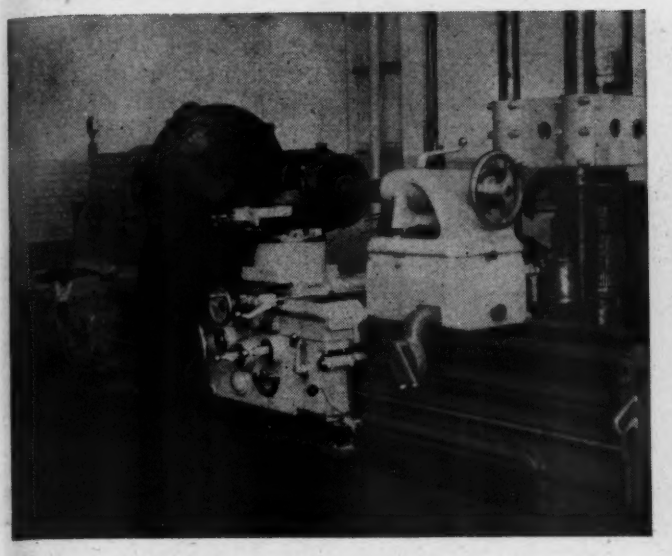
THE most recently completed Diesel-electric locomotive repair shop is that of the Chicago, Burlington & Quincy at West Burlington, Iowa. Lighting and power facilities for the shop were described in the November, 1946 issue of *Railway Mechanical Engineer*. Mechanical repair facilities in the shop are described in the January 1947 issue. This article is devoted to the section of the shop in which electrical work is done.

The shop takes care of reconditioning and major repair of all electrical equipment used on Diesel-electric locomotives and passenger motor cars on the railroad and also shop motor work originating in West Burlington. The shop's major activity is the periodic overhaul of Diesel locomotive traction motors. Trucks are changed out at Fort Worth, Tex., St. Joseph, Mo., Denver, Colo., Lincoln, Neb., 14th Street, Chicago, Ill., Clyde, Ill., and Minneapolis, Minn. Motors from these trucks are shipped to West Burlington for overhaul, and the reconditioned motors are returned to the change-out points. Two baggage cars, and two freight cars, specially equipped for transporting motors, are used for this purpose.

At present there are 956 motors in service in freight, passenger and switching locomotives. Most of the motors are overhauled at 200,000-mile intervals—a few at 150,000 miles. Passenger locomotives make up to 340,000 miles a year. Switching motors are changed out each



Shop-made gauge for advancing pinions—It is screwed into the pinion thread and measurement made by the central knurled screw with rim marked in thousandths



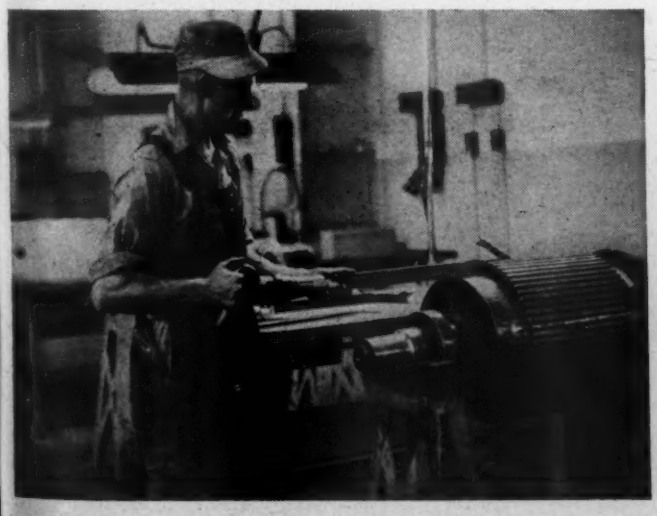
Turning a traction motor commutator

time locomotives receive general overhauling. Additional work is, of course, required in case of damaged motors.

Procedure

When a motor is brought into the shop it is cleaned and dismantled. Both armature and field are given a high-potential test at 1,000 volts for one minute. If the motor is wet when it is brought in, a Megger insulation tester is used before it is subjected to a high-potential test. If the resistance is less than three megohms, the hi-pot test is omitted.

The armature and frame are then cleaned in a spray booth with Stanisol, fresh cleaner rather than recirculated cleaner being used on the armature. The frame is also rinsed with fresh cleaner. After cleaning, the armature is impregnated in the vacuum impregnator and the frame is again given a high-potential test, this time at



Coils are stripped from armature slots with the aid of slot-size wedges driven with an air hammer

2,400 volts for one minute. It is then inspected and leads and other parts repaired if necessary, after which it is spray-painted in the spray booth with G. E. 1201 enamel. Air is exhausted from the booth by a motor-driven fan and the paint spray carried along with the air is removed from the air by dry type metal filters.

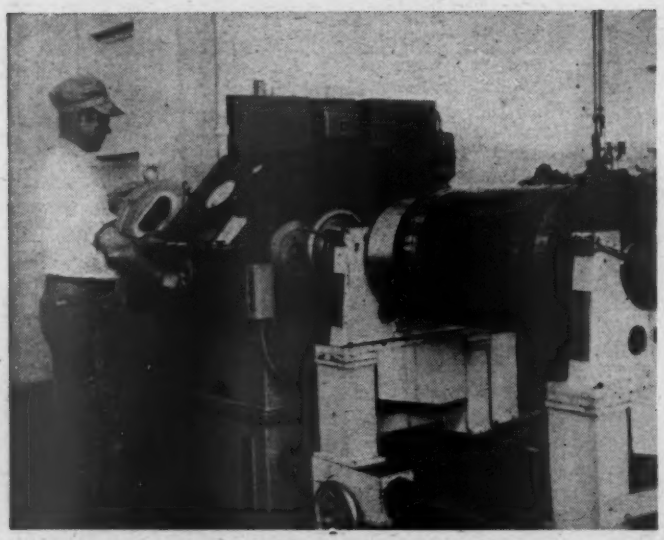
Brush holders are cleaned, repaired and replaced, and

One end of a freight car specially equipped with extension rails and end door for loading traction motors

are given a separate high-potential test at 2,400 volts. Mechanical work on the frames includes inspection, tightening, replacement of broken cap screws or bolts, and when necessary, building up and remachining of axle support bearing caps and bearing fits. The finished frame is set on end ready for application of the armature.

After impregnation with Westinghouse 8826-1 synthetic varnish, the armature is baked for 20 hours at 300 deg. F. When it is removed from the oven, it is cooled on an armature cooling stand in which a motor-driven blower drives air through the ventilating ducts. When dry, it is given a 2,400-volt, high-potential test both commutator to ground and from the commutator end band to commutator. It is then placed on a lathe

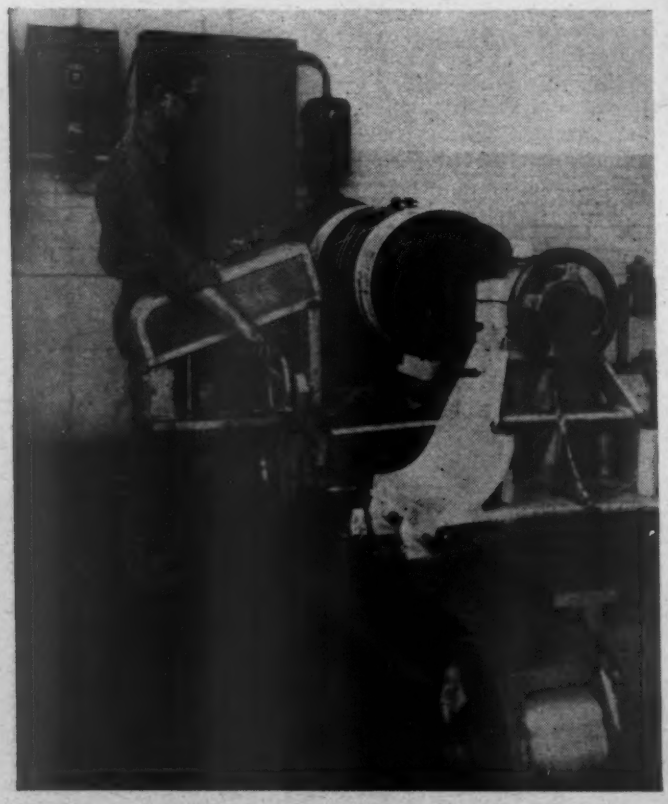
Soldering commutator risers—Two screw driven plungers raise molten solder to correct level—An asbestos ring gasket under risers restricts flow of solder from pot to catch tray—Solder is melted electrically and temperature shown by indicating pyrometer



Balancing machine for traction motor armatures—A second machine is used for small armatures

where the shaft is checked for fits with snap gauges. The shaft is Magnaflux tested and the commutator is turned.

Commutator slots are cleaned and undercut by hand with a hack saw blade. If the slot is too shallow, it is undercut with a rotary cutter on a banding machine attachment. The armature is given a bar-to-bar test, creepage surfaces are painted with G. E. 1201 enamel

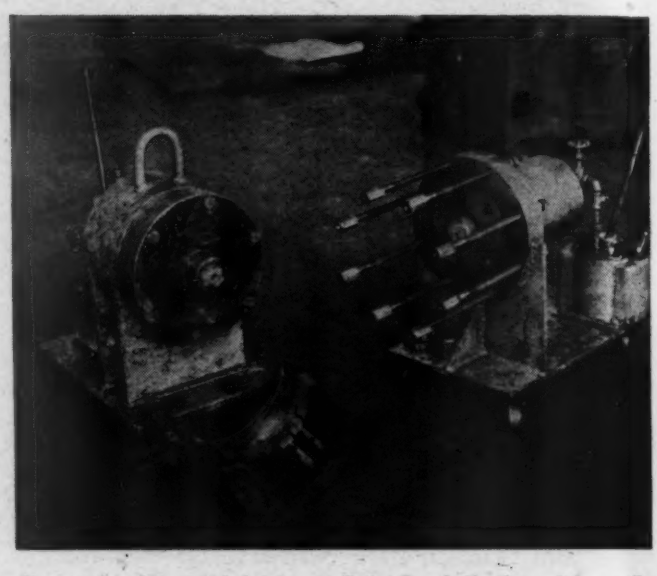


An armature being banded on the armature machine

and the armature is then taken to the balancing machine. It is balanced to ⅛ of an ounce.

Bearings are then applied and the armature replaced in the frame, after which brush holders are set and adjusted and brushes applied. The frame is then set in a horizontal position and bearing housings are pulled into place. Impact wrenches are not used for this purpose, but one is used for the pinion nut and smaller ones for the frame bolts. In the case of sleeve bearings, (bronze-backed, babbit-lined bearings), the bearings are pressed into place in the frame and are line bored on the boring mill. Roller bearings, which are taken out in disassembly, are returned to stores and replaced with new or reconditioned bearings. The reconditioning of bearings is done by the manufacturer. Bearing caps are removed and bearing alignment is measured with a dial test indicator after which the caps are replaced.

With the motor in a horizontal position on the floor, grease is applied to the bearings. The amount, is determined by weight. A cold fit of the pinion is taken, a 75 per cent fit being considered satisfactory. The motor is then connected to the 250-volt d.c. shop power through a variable rheostat and run light at 2,100 r.p.m. for 1½

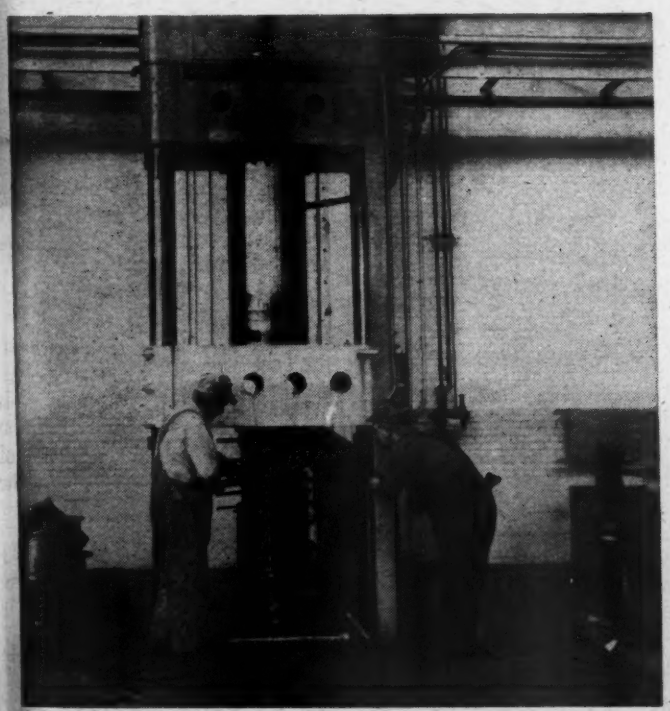


Shop-made pinion and bearing pullers—One-half of a pinion puller adapter is shown in front on the floor

hours. Bearing temperatures are watched and the commutator is stoned. This also serves to seat the brushes. The shaft is then allowed to cool and the pinion is applied. An induction heater is used to heat the pinion and the amount of advance is governed by the size of the pinion. A 15-tooth pinion is advanced along the

Motors receiving run-in tests—Two speed-control resistors are shown behind the motors

The vacuum impregnator and the baking ovens — At the left is the armature cooler



Hydraulic press being used to apply commutator vee ring

shaft from the cold fit position from .045 in. to .055 in. Pinions having from 16 to 25 teeth are advanced from .050 in. to .060 in. The motor is finally given a 1,500-volt, high-potential test and released for service.

Rewinding

If rewinding is necessary coils are cut off in a lathe close to the laminations on both ends. The coils are removed from the slots with an air hammer tool and the ends of the coils are removed from the risers with hand drifts. The equalizers are not cut by the lathe and are removed by hand. The armature core and slots are cleaned, sanding discs being used to surface the slots. Risers are cleaned with a taper reamer driven by an air motor. The commutator is given high-potential and bar-to-bar tests.

In the process of rewinding, the core is first insulated and equalizers laid, after which the equalizers receive a high-potential test. Bottom coils are laid and insulated, after which top coils are laid. The back end is then temporarily insulated and the risers are soldered in a dipping pot. This is followed by bar-to-bar and high-potential tests. The temporary insulation is then removed and the back connections silver-soldered with brazing tongs. The back end of the armature is then insulated and the armature given a bar-to-bar test at 250 volts. Following this, the back end is cemented and the armature is given a first impregnation and baked. The end bell is then applied, the armature banded, given a second impregnation and baked for 20 hours. After this the procedure is the same as for the routine overhaul which follows impregnation and baking.

The cleaning booth is lighted with vapor-proof fluorescent units

Shock-Proof Caboose Axle Drive

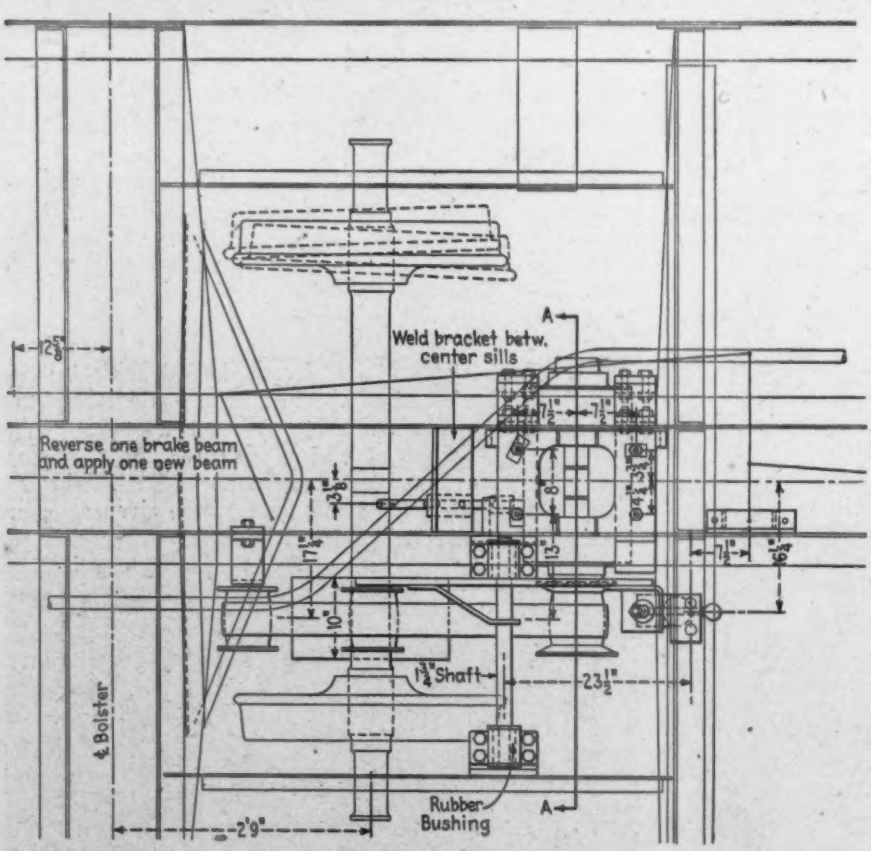
A. T. & S. F. caboose 2189 has been equipped with a Safety type BB-2430, 2-kw. body-hung generator for furnishing power for train communication service. The generator is controlled by a Safety FF-10 heat-compensated regulator and operates in conjunction with 16 cells of EPTA-11 ironclad battery.

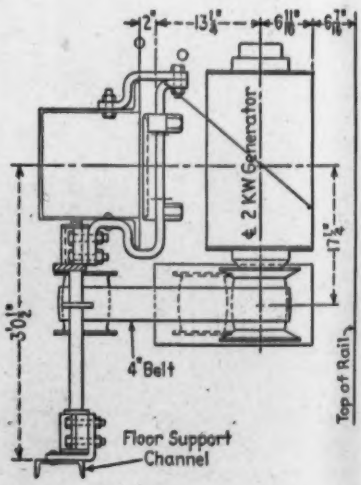
The generator drive is different from the drives that are in general use in that the generator is rigidly suspended. Belt tension is provided by an idler pulley which moves vertically and is, therefore, not subject to the effects of coupling shocks. The generator is pivoted so that it can be swung in an arc toward the truck frame to facilitate the application or removal of an endless belt. The generator is swung back from the truck frame after the belt is applied to assist in taking up the slack of the belt. The generator is then locked in the position desired for operation by use of two ball nuts on a threaded adjusting rod.

Santa Fe develops endless belt drive using rigidly mounted generator with an idler pulley on a pivoted arm supplying belt tension

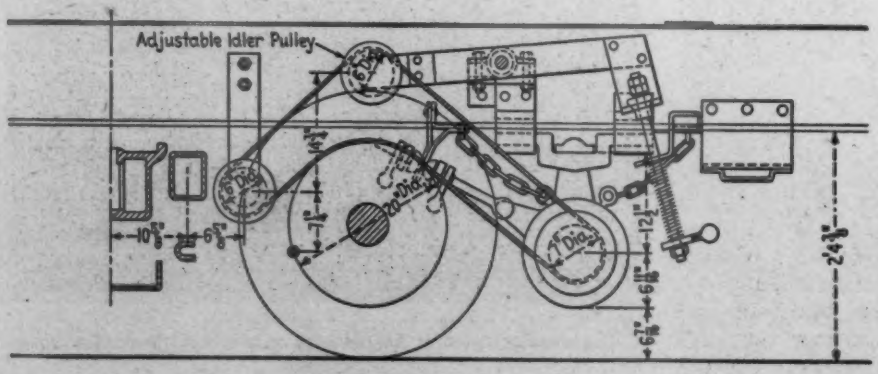
An adjustable ball bearing idler pulley is mounted on a pivoted lever which in turn is attached to the car body by a rubber bushing or bearing which is under compression. The rubber bushing disposes of the wear common to lubricated metal bearings operating under these conditions and also cushions the ball bearing.

The pivoted lever which controls the location of the adjustable idler pulley is attached to a tension rod and a tension spring which keeps the belt in practically constant tension at all times. The tension rod is equip-

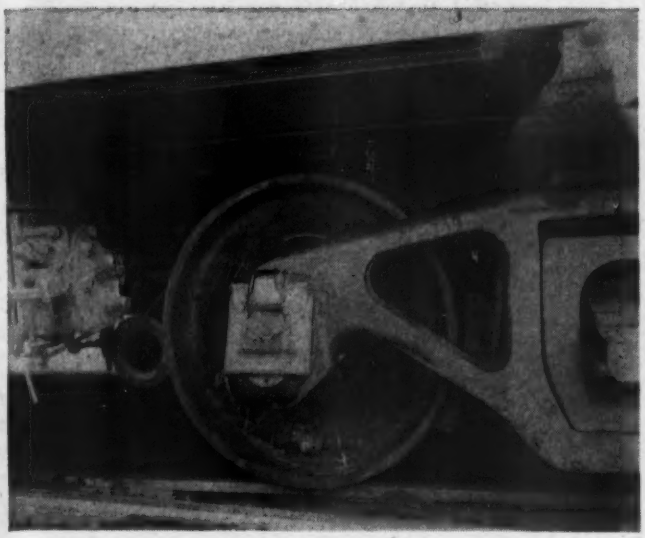




Section A-A



Top, side and end views of the drive—The axle pulley is flat and the other three are crowned



The endless belt drive as applied to Santa Fe Caboose 2189

ped with a ball nut and a lock nut which permits the tension of the belt to be changed as necessary with the stretch of the belt. This adjustment of the idler pulley and of the generator position permits continuous service of the belt throughout its life.

There is also a stationary idler pulley mounted on the car body back of the axle pulley. All pulleys, with the exception of the axle pulley, are mounted on the car body. This facilitates their being mounted in the same plane and to be kept in proper alignment with each other; a factor essential for long belt life. The two idlers permit the use of an endless belt.

The belt is kept in proper alignment regardless of wheel play or track curves by the use of a flat face axle pulley and crowned idler pulleys and generator pulley. The flat face axle pulley permits the belt to take any position necessary on the axle pulley to keep in proper alignment when rounding a curve. The fact that the generator is held in a stationary position relieves the belt of the shocks incurred with the usual generator drive, where the weight of the generator plus the spring tension of the belt is thrown against the belt when starting or stopping a train.

Disposal of these shocks and the elimination of the belt fastener have served effectively to avoid frequent belt losses, failures and high maintenance cost.

This caboose has been used only in tests since communication service has not been fully established on the Santa Fe. The tests that have been conducted show that the drive will furnish ample power on heavy grades where train speed is low. The generator cuts in a 13½ m.p.h. and develops full load at 17 m.p.h.

The belt, which consists of a 4-in. flat-face endless belt, has given exceptionally good belt life. The last belt was applied January 17, 1946 and is still in service. There have been no broken battery jars, although this car has been used in mountain territory where severe operating shocks are common.

Vacuum Cleaner For the Diesel Shop

The Denver & Rio Grande Western has for some time been using a vacuum cleaner for inside cleaning of Diesel-electric locomotives and has found that it will satisfactorily perform a variety of tasks. It is used for general inside cleaning, and since it must pick up accumulations of water and oil, as well as dust and heavier dirt, it is fitted with a 20-gal, water separator which removes liquids from the air stream before the air reaches the dirt collector.

One of the specific applications to which it is well adapted is that of removing dust caused by the stoning of main generator and traction-motor commutators. In the case of the traction motors the work of stoning is done through one of the bottom brush covers and the dust is drawn out of the other bottom cover during the process, to prevent its working up into the machine. Similarly, in the case of generators, the work is done through one cover while the dust is removed from the other by the cleaner.

It has been found particularly useful for removing solutions or residues from inaccessible places which must be scrubbed. One of these is the main generator sump and another is the Vee between the engine cylinders. The procedure consists of scrubbing such places with a Turco R. R. 1 solution or Diesel fuel oil, and removing the residue with the vacuum cleaner. Other special applications which would otherwise present special difficulties are cleaning soot out of steam generators and removing accumulations of dirt from dynamic braking and other resistor grids. The railroad has developed several types of special nozzles to meet the requirements of specific applications.

The cleaner is an Exidust vacuum cleaner made by the Allen-Billmyre Company, Mamaroneck, N. Y. It is driven by a 5-hp. motor and produces a 6-in. mercury vacuum with an air volume of 280 cu. ft. per min. It contains a 2-cu. ft. dust bucket, has 36 sq. ft. of filter area, and can be used with one 2-in. or two 1½-in. air lines.

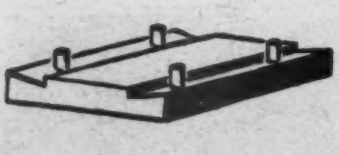
The cleaner as used in the D. & R. G. W. Diesel shop—The water separator is shown at the left—The operator is holding a floor-cleaning nozzle

NEW DEVICES

Frame-Guided Spring Saddle

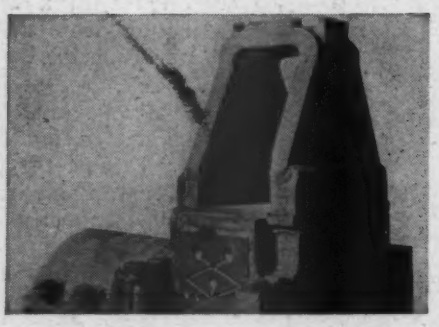
A frame-guided spring saddle has been designed to prevent the failure of locomotive spring rigging and to give smooth action on curves by the Franklin Railway Supply Company, Inc., 60 East 42nd street, New York 17. With this design the driving boxes are free to slide laterally under the saddle plates as they follow the axle in its lateral motion, while the saddles themselves and the springs and rigging are held in strict alignment with the locomotive frame. The saddle is applicable to either roller-bearing or plain-bearing boxes, and to new or existing locomotives.

The saddles are supported on saddle plates which are free to slide on the driving box as it moves laterally. The saddle, spring and spring rigging therefore maintain alignment with the frame of the locomotive at all times. This eliminates the usual strains on the spring rigging which frequently cause failure of the spring-rigging parts—twisting, bending or tilting of the saddle, fanning of the spring and bending of hangers—when the spring saddle moves laterally with the box while the bottom end of the hanger is held in line with the frame.



The three parts of the frame-guided spring saddle are, from top to bottom, the spring saddle, the saddle plate and the hardened bearing surface on the driving box

This design permits full lateral movement of the driving box and axle without any restriction from binding of the



The Franklin frame-guided spring saddle

spring rigging. Locomotive weight is distributed evenly over the entire top of the driving boxes. Bending stresses in the axle, and particularly at the wheel fit, are thereby reduced, increasing axle life.

The driving boxes are connected in pairs by a suitable housing and move in unison with the axle. The top of each driving box is provided with a flat bearing surface which supports a saddle plate; this plate is free to move laterally in relation to the box, but cannot move longitudinally because of guides at the front and back of the box. The spring saddle rests on the saddle plate and a fixed relation between the two is maintained by the tapered seats and the locating dowels. The saddle closely straddles the locomotive frame and is free to move up and down with respect to the frame, but can't rock or move laterally.

The sliding surfaces on the driving box and on the saddle plate are hardened, and provision is made for lubrication. Hardened plates are attached to the frame between the saddle legs to prevent wear at this point.

High-Production Car Wheel Lathe

The Sellers "75" Lathe is a single-purpose, high-production machine developed solely for turning car wheels and truck wheels 28 in. to 50 in. diameter on the tread. It is designed to simplify the manipulation so that the least possible time and labor should be required for handling and setting the work and for bringing the necessary tools into successive operation, as well as to take the heaviest cuts at the highest speed that the new tool steels will permit. It will turn all kinds of steel car wheels or car wheels with steel tires from 28 in. to 50 in. diameter, whether they be plate, arm, or composite construction, without requiring any holes or openings in the wheels for bolts or drivers. It will accommodate axles with inside as well as outside journals, and axles with driving gears or armatures between the wheels.

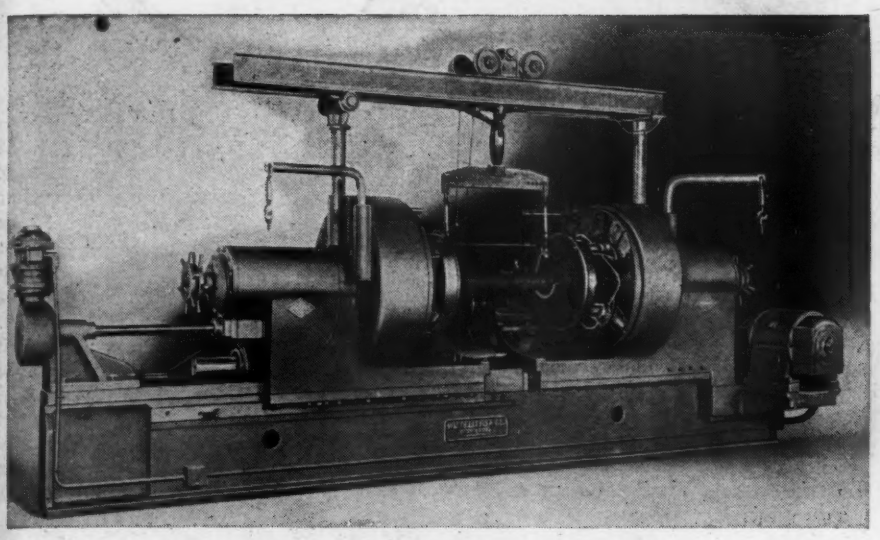
This product of the William Sellers Company, 1600 Hamilton street, Philadelphia 30, Pa., is composed of three main units, the bed, the fixed head and the movable head. The tool slides and turrets are carried directly by the head castings. The construction is rigid and compact, while the control is convenient for the operator enabling him to make horizontal and transverse adjustment of the tools from one position. The distance between face plates varies from a minimum of 7 ft. ½ in. to 10 ft. 2½ in. The lathe has 10-in. drivers and will accommodate plain journals up to 7 in. by 12 in., while the face-plate recesses for roller-bearing equipment are 8½ in. deep and 26-in. square. Face-plate speeds range from 1¼ to 7½ r. p. m. with either a. c. or d. c. drive, and the feeds range from 1/16 in. to ½ in. per revolution in 1/16-in. steps.

The bed is of heavy construction and carries one fixed and one movable head. The latter is not supported on the top of the bed, but is carried on tracks on each side of the bed to protect the bearing surfaces from chips and dirt. Steel bars bolted on each side of the bed provide the tracks on which the head slides. There is no bearing between the top of the shear and the movable head. Removable shoes on the head slide on these tracks and taper shoes are provided between these supporting shoes and the underside of the overhanging lathe shear. These taper shoes may be adjusted so that there is no excessive lost motion between the bed and the head. With this arrangement parts which may become worn in heavy service can be removed and replaned without dismantling the lathe.

The main casting on each head is extended forward along the bed forming a support for the slide rest. By this construction the head and tool slide is a self-contained unit and the strains due to the cut, which ordinarily are resisted through the bed, tending to overturn the head, are eliminated. Each head is provided with a face plate, the two driven in unison by a very large driving shaft and carried upon large sleeves mounted in anti-friction bearings. Each face plate is provided with inter-connected hydraulic driving dogs, thus assuring equal pressure on the outside rim of the wheel.

The gearing from the motor to the face plates consists of a worm-and-wheel primary reduction for efficient quiet operation and specially designed spur gears with continuous tooth action on the through shaft and face-plate gears. All high-speed shafts are mounted in anti-friction bearings, others in bronze-bushed bearings. All pinions are supported with bearings on both sides. Direct-current motors are put on shop lines where direct current is available. Where alternating current only is available, a variable-speed drive consisting of a motor-generator set and motor are used to give wide speed selection with maximum case of adjustments.

The tool posts are each an integral part of their respective heads. Thus the tool maintains a fixed relation to the face plate irrespective of the gauge of the wheels being turned, and a considerable amount of adjustment is eliminated. The turret



The Sellers "75" Car Wheel Lathe

is made of alloy steel and so designed as to require the least possible projection of the tools. Should the roughing tool require changing during an operation it may be removed from the back of the turret and replaced without stopping the lathe or without revolving the turret. These turrets will be equipped with the new Sellers "Smooth Finish" tool holders (patent applied for) to carry the final finishing tool. With this type of tool holder, it is said to be possible to get a chatterless finish. The slides have heavy steel shoes hardened and ground on the surfaces that are exposed to dirt and chips. Adjustments for wear are provided.

Four tools for each turret are required for the entire operation of turning a wheel. A partial turn of the wrench tightens or releases the turret, which may readily be turned when free. When the proper tool is opposite the work, a double-cam stop is laid over behind the turret, rigidly clamping it. The movable head is adjusted by a motor mounted at the extreme right-hand end of the machine. The motor drives a screw through a slip clutch which protects the gearing and limits the initial pressure applied to the drivers. Whenever the power is turned off the mechanism serves to clamp the head securely in position.

When turning wheels with roller bearings it is usually only necessary to remove the end cap of the housing and to mount the axle on the centers. When turning plain bearings it is preferable to grip on the outside of the journals. For this work the recess in the face plate is filled with a bearing support for the spindle. This support is secured with bolts and is easily and quickly removed with the crane supplied with the machine. The lathe is, therefore, fully equipped for either sleeve or roller bearings within the capacity of wheel diameter.

Hexteel Flooring

Hexteel is a heavy-duty steel grid designed to be imbedded in concrete, mastic, or any plastic floor material. When so imbedded it makes a solid, one-piece, rigid, level and seamless mat in the entire surface. The steel tops of the mesh are exposed so that truck wheels may move in any direction without leaving the steel bearing surface.

The dropping of heavy material does not affect Hexteel floor. Chipping, cracking, creeping, splintering and spalling are practically eliminated. Ruts and pot-holes do not form, and safety is promoted. Hexteel may be used for both new and old floors, complete, and for repairs by inset, of broken or crumbling spots. To apply Hexteel, concrete or mastic is floated flush with the top surface of the grid, and may be steel-troweled; sold mastic may be tamped and rolled.

Applying Hexteel flooring—Inset shows an enlarged view of the grid

This product of the Wm. F. Klemp Company, 6601 S. Melvina avenue, Chicago 38, comes in standard units 3 ft. by 10 ft., 12- and 14-gauge thicknesses, and in ¾-in., 1-in. and 1¼-in. depths.

Journal Protective Coating

To help solve the problem of providing all-weather low-cost protection against rust to journals, castings, driving rods, machined surfaces and finished parts, a rust preventative known as R-9 has been developed by Rust-Oleum, Box 110-Y, Evanston, Ill. Available in 55-gal. drums and 5-gal. cans, it is designed specifically for ease of application and removal as well as for protecting materials in either indoor or outdoor storage by covering them with a tough, pliant coating for the exclusion of moisture over extended periods.

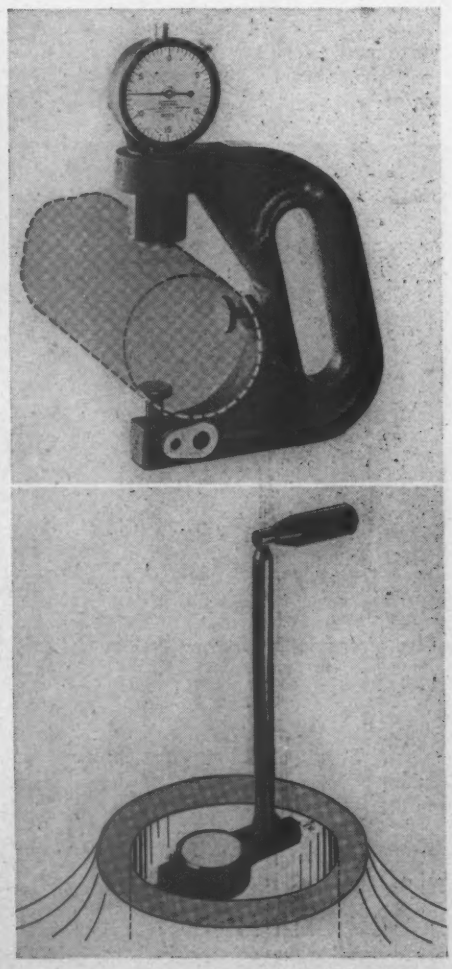
R-9 is said to be easy to brush on, it dries within 72 hours, will not rub off, wipes clean with gasoline, mineral spirits or any solvent even in temperatures as low as 30 deg. below zero, and is nontoxic to abrasions or cuts on the hands.

Wheel and Axle Dial Indicating Gauges

For safe and economical maintenance of car wheels two dial indicating gauges have been developed by the Federal Products Corporation, 1144 Eddy Street, Providence, R. I. Used for the dimensional inspection of car-wheel bores and axles, the gauges are said to result in a better wheel fit, thereby eliminating weak fits and extensive strains when wheels and axles are pressed together.

Wheels can be bored and axles turned precisely to the desired dimensions. The wheels and axles can be stored disassembled to save storage space. The interchangeability of the wheels and axles assures that they will fit together properly.

Model 264 P-230 is a dial-indicating



Federal Products Corporation Dial Indicating Gauges—Above: The snap gauge for axles—Below: The gauge for measuring wheel bores

snap gauge used to measure the diameter of the axle while it is being turned down to the required size. It can also be used to select and identify the exact diameter of the axles that the wheel must be bored to fit. The gauge has a range of ⅜ in. and is graduated to 0.001 in. It has a dial indicator with Federal Cushioned Movement, which is said to enable it to withstand shocks under heavy use. An auxiliary spring built into the sensitive contact helps to align the gauge properly to the work, and to offset the weight of the gauge and any operator pressure on the sensitive upper anvil.

The model 202 P-125 gauge measures the wheel bore. It allows the operator to determine the exact dimensional condition of the bore at any point throughout its length. The gauge not only measures the diameter of the bore, but any out-of-round, taper, hollow or high spots. It is built with Federal full-jeweled cushioned movement to withstand abuse, and has a range of ⅜ in.

Both of these gauges are said to be easy to handle and do not require the services of highly skilled operators.

Peening and Scaling Hammer

An air-powered peening and scaling hammer, Model 7002, designed for removing scale and rust on welded parts, has been announced by The Aro Equipment Corporation, Bryan, Ohio. It can also be used for removing sand on small castings and

Peening and scaling hammer that can be used in hard-to-reach places

peening tubular rivets and other small parts. This tool delivers 5,000 blows per minute, yet is said not to distort light sheet metal when removing scale.

The piston and cylinder are of alloy steel, precision ground. The body is cast aluminum and has an automatic throttle valve. Overall length of the hammer head is 2½ in., and the tool is 7 in. in length. It is small enough to get in hard-to-reach places. The length of the connection between the hammer head and the body is adjustable.

Test Plugs

Hydro-Matic self-sealing test plugs are a means for closing openings in pressure vessels to be tested by internal pressure. They are suitable for use in hydromatic or air testing and may be inserted in or removed from either threaded or plain openings in a few seconds.

The testing pressure from within the tank is utilized to force and hold the seal against its seat. The effective pressure area within the cylinder is greater than the area of the tank opening to insure a tight leak-proof seal against the seat. An oversized tapered head on the pull rod centers itself against the inside edge of the tank opening and sets up a positive resistance to the pull exerted within the cylinder when forcing the seal against its seat.

These test plugs are available from stock for ½ in. to 2 in. standard pipe thread

The Hydro-Matic self-sealing test plug

openings from the manufacturer, the Mechanical Products Corporation, 168 North Ogden avenue, Chicago 7. They are suitable for testing pressures up to 500 lb. per sq. in. Special plugs may be had on order.

Face Shield

A face shield designed to give extra overall protection has been announced by the American Optical Company, Southbridge, Mass. The shield guards against the impact of flying particles and splashes of hot metals, acids, oils, alkalis, hot water, etc.

The extra large window, 18¾ in. by 10 in. is made from cellulose acetate .040 in. thick. It extends completely around the face, even covering the ears. The fibre head guard protects the upper forehead and covers the entire top of the head as an additional safeguard against injury.

The headgear is made for comfort and long wear. The band slides within a fibre

Face shield designed by the American Optical Company

sleeve in back, permitting easy adjustment to varying head sizes. A metal knob allows for quick adjustment. In front, a leather sweatband absorbs perspiration. Positive friction joints hold the window securely in "on" or "off" guard position.

Vacu-Blaster

The Vacu-Blaster, a blast-cleaning device for metal, concrete, or other hard surfaces, is now in production by the Vacu-Blast Co., Inc., 1054 Broadway, Burlingame, Calif. It has its own vacuum return system, which, it is said, permits no abrasives or other particles to escape into the open, and which makes possible blast-cleaning under conditions that once would have prohibited the use of this effective means of removing corrosion, paint, stains, and other deposits.

Operated in much the same fashion as a single household vacuum cleaner, the Vacu-Blaster may be used without special precautions or preparations. No masks, goggles, or protective clothing are needed. There need be no interruption of other operations or business in the immediate vicinity. The vacuum pick-up system is said to be so positive in action that precision machinery, food products, or other objects of value need not be removed, or even covered, although they may be in a position adjacent to an operating Vacu-Blaster.

Many types of abrasives may be used, depending upon the nature of the work to be done and the finish desired. As the spent abrasive is reclaimed by the Vacu-Blaster and reused as long as it remains effective, the costs involved in purchasing and handling abrasive are considerably reduced.

The operation of a Vacu-Blaster is predominantly automatic. The blast is controlled by a switch at the gun through which the abrasive blast is directed and through which grit and dust are picked up. The vacuum system operates continuously, returning grit and refuse to the

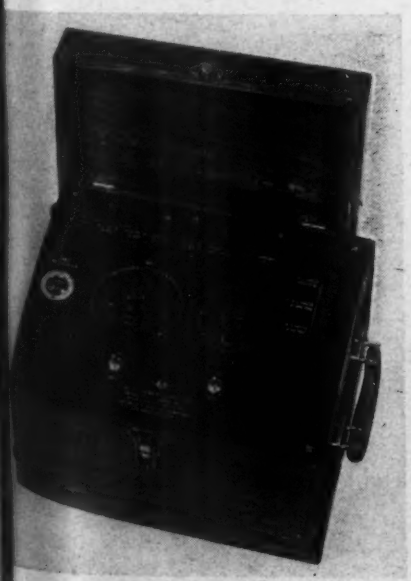
This Vacu-Blast machine, in use at the Baldwin Locomotive Works, replaces the use of a $40,000 sandblasting room

reclaiming tank, where the reusable grit is returned to the blasting system while dust and refuse are shunted off to a dust collector.

Reclaimed abrasive is automatically dumped into the grit-supply tank at the close of each operating cycle. At the same time, the blasting assembly is automatically flushed with clean air to prevent possible clogging. The loading of fresh abrasive into the Vacu-Blaster is easily accomplished by the vacuum system, which picks up the grit through the blasting gun from a container on the floor.

Power for Testing Meters and Relays

Packaged power supply units for testing electrical relays and instruments are being made by the Arthur E. Booth Company, 210 West 7th Street, Los Angeles 14, Calif. They are available in both portable and bench models and provide sources of either a.c. or d.c. power in smoothly adjustable values from zero to the maximum output of the unit. They are suitable for the testing of relays and for checking the calibrations against Standards, of instruments such as a.c. and d.c. ammeters, a.c. and d.c. milliammeters, a.c. and d.c. voltmeters, wattmeters, power factor meters, d.c. millivoltmeters, and microammeters. The present line of power units supplies a full range of a.c. and d.c. currents from zero to 10 amp., and potentials from zero to 750 volts.



A 10-amp., 750-volt portable power unit which weighs about 35 lb.

Refrigerating Unit for Interior Car Mounting

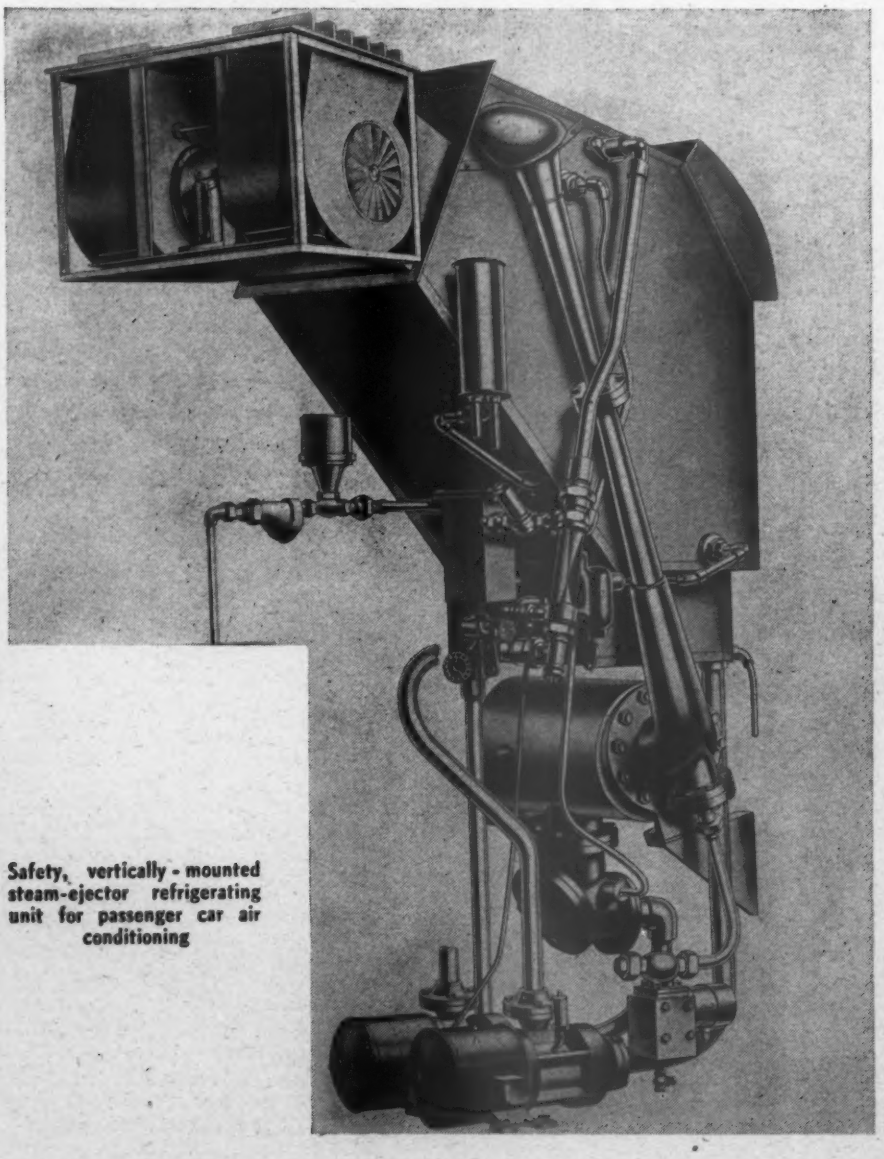
A steam-ejector refrigerating unit arranged for interior car mounting has been designed by the Safety Car Heating & Lighting Co., New Haven, Conn., for the Chicago, Milwaukee, St. Paul & Pacific. This equipment is arranged to be accommodated in a space 3 ft. 4 in. transverse of the car and 3 ft. 3 in. lengthwise of the car. The condenser and its casings are mounted in the upper portion of this space and the two pumps are mounted in the car floor. Condenser air is taken in through louvers and a screen where the roof meets the car side, and then passes through the condenser and a duct to the fan and motor assembly which is mounted on the roof.

The fans and motor of this assembly are mounted on a plate which joins the roof hatch so that when this is lifted, the entire assembly is removed as a unit. The air outlet dampers are the same as those used with the standard overhead steam ejector refrigerating unit.

The motor-operated steam valve and the steam separator and reducing valves are mounted in the compartment. The sump of the condenser casing is equipped with a flushing device arranged so that a hose connection can be made outside of the car for flushing the dirt from the sump. The condenser may be removed through a hatch in the roof.

This arrangement possesses several advantages. All of the equipment is within the car where it is protected from dirt and damage. As all of the elements are inside of the car, they can be easily inspected and minor adjustments made from inside while the car is enroute. Another important advantage is the fact that the condenser air is taken in at the roof level and is far cleaner than the air which passes through the underframe unit. This should reduce the labor of servicing and cleaning the condensers.

The weight of the unit is approximately 2,300 lb., and the steam consumption is 230 lb. per hour.



Safety, vertically-mounted steam-ejector refrigerating unit for passenger car air conditioning

NEWS

John D. Conway Retires

THE Railway Supply Manufacturers' Association has announced the appointment of A. W. Brown as secretary and treasurer, succeeding John D. Conway, who had held that post since 1910. The office of the secretary and treasurer has been transferred from Pittsburgh, Pa., to 30 Church street, New York 7.

Mr. Conway, who continues an advisory connection with the association as honorary secretary, was born at Vanport, Beaver County, Pa., December 15, 1863. Following a public-school education he entered railway service in 1881 as a telegraph operator on the Cleveland & Pittsburgh (now part of the Pennsylvania). From 1885 to 1888 he held a similar position on the Pittsburgh & Lake Erie, after which he was for three years a clerk in that road's motive-power department. From 1891 to 1910 he was chief clerk in its motive-power and car departments. He became secretary of the Railway Club of Pittsburgh when it was organized in 1901, and since 1918 has held that post continuously.

C. H. Quinn Establishes N. & W. Scholarship at Purdue

CHARLES H. QUINN of Los Angeles, Calif., formerly chief electrical engineer of the Norwolk & Western, has established a Norfolk & Western scholarship at Purdue university. Only employees of the railroad and members of their immediate families are eligible for the scholarship, which will provide the recipient with $500 annually for four college years.

Mr. Quinn is a graduate of Purdue (1899). In 1900 he was appointed an instructor in the university's school of electrical engineering. He joined the Norfolk & Western in 1901. He was first employed in the drafting department of the mechical engineer's office, and later became, successively, electrical foreman, assistant engineer (motive power) and chief electrical engineer, serving in the last position until his resignation in 1923. Mr. Quinn is now chairman of the board of the Electrical Products Corporation and vice-president of the Basin Oil Company.

Metal Running Board Date Extended

THE A. A. R. General committee has modified Par. (7) Sec. (r) of interchange Rule 3, extending the effective date thereof, in so far as metal running boards, dome steps, and dome platforms on tank cars are concerned, to read as follows:

(r) (7) Running boards, metal; Metal running boards must be applied to box and other roofed cars (including Type LO hopper cars) built new and to cars of these types rebuilt, on which an all-metal roof is applied, on and after April 1, 1947, and to tank cars built new or where new or secondhand tank is applied to existing underframe or secondhand tank is applied to complete new underframe (including complete new trucks), on and after September 1, 1947, which shall comply with the following specifications for running boards other than wood, for box and other roofed cars and tank cars, adopted as standard in 1943 and revised 1946. In interchange.

This extension of effective date is necessary because of the inability of the tank-car builders to secure the necessary material for metal running boards, dome steps, and dome platforms in time to meet commitments involving delivery of new tank cars for a certain period after April 1.

Effective January 1, 1947, new Item 9 is added to Interchange Rule 56, to read as follows: 9. Spliced Hose. This action abrogates the necessity for issuing defect cards, under the terms of Rule 57, to cover spliced air hose on cars offered in interchange.

It is found that considerably more cars than anticipated are still equipped with spliced air hose and their removal will be expedited and delays avoided at interchange points by establishing renewal of spliced hose as car owner's responsibility. This action has been approved by the Arbitration Committee.

A. A. R. Moves to Reduce Empty Box-Car Mileage

Box cars are badly needed on all lines, particularly western railroads, and the A. A. R., Mechanical Division, announced on

Orders and Inquiries for New Equipment Placed Since the Closing of the February Issue

LOCOMOTIVE ORDERS

Road	No. of locos.	Type of loco.	Builder
Atchison, Topeka & Santa Fe	1[1]	4-8-4 gas-turbine (oil)	Baldwin Loco. Wks.
Erie	9[2]	6,000-hp. Diesel-elec. frt.	American Loco. Co.
	6[2]	1,000-hp. Diesel-elec. switch	American Loco. Co.
	5[2]	660-hp. Diesel-elec. switch	American Loco. Co.
	10[2]	1,000-hp. Diesel-elec. switch	Electro-Motive
	3[2]	1,000-hp. Diesel-elec. switch	Baldwin Loco. Wks.
	1[2]	600-hp. Diesel-elec. switch	Baldwin Loco. Wks.
Norfolk Southern	10[2]	1,500-hp. Diesel-elec. frt.	Baldwin Loco. Wks.
Pennsylvania	5	6,000-hp. Diesel-elec. pass.	Electro-Motive
	6	7,500-hp. Diesel-elec. frt.	Electro-Motive
	9	6,000-hp. Diesel-elec. pass.	Baldwin Loco. Wks.
	5	6,000-hp. Diesel-elec. pass.	Amercian Loco. Co.
Virginian	4	6,800-hp. electric	General Electric

LOCOMOTIVE INQUIRIES

Road	No. of locos.	Type of loco.	Builder
New York Central	10	2-8-4	

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Baltimore & Ohio	2,000[3]	50-ton hopper	Bethlehem Steel Co.
	1,000[3]	50-ton hopper	American Car & Fdry.
	500[3]	50-ton hopper	Pressed Steel Car
	500[3]	50-ton hopper	Ralston Steel Car
Chesapeake & Ohio	1,000[4]	70-ton hopper	General-American
	1,000	50-ton box	Pullman-Standard
Chicago & Eastern Illinois	300	50-ton hopper	Pullman-Standard
Delray Connecting	100	70-ton hopper	Greenville Steel Car
Grand Trunk Western	500	50-ton box	Pullman-Standard
Kansas City Southern	800	50-ton box	Pullman-Standard
Louisville & Nashville	1,600	55-ton hopper	Pullman-Standard
	1,200	55-ton hopper	American Car & Fdry.
	200	70-ton ballast	American Car & Fdry.
Minneapolis & St. Louis	250	70-ton hopper	Pullman-Standard
Missouri Illinois	100	70-ton ballast	American Car & Fdry.
	15	70-ton covered cement hopper	American Car & Fdry.
	35	70-ton covered hopper	American Car & Fdry.
Missouri Pacific	18	70-ton container	Company shops
New York, Chicago & St. Louis	600	50-ton box	Pullman-Standard
New York, New Haven & Hartford	500	50-ton box	Pullman-Standard
Norfolk & Western	20	Caboose	Company shops
Seaboard Air Line	500	50-ton box	Pullman-Standard
	175	70-ton phosphate	Pullman-Standard
Wheeling & Lake Erie	1,000	70-ton hopper	Greenville Steel Car
	250	50-ton box	American Car & Fdry.

PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Missouri Pacific	4	Day-and-night coaches	Budd Co.
	2	Dining-lounge	Budd Co.
	2	Sleeping	Budd Co.
Norfolk & Western	20	Sleeping	Budd Co.

[1] This passenger unit has been designed by research engineers of the Santa Fe, Baldwin and the Elliott Company of Jeannette, Pa. It will cost approximately a half million dollars, measure about 77 ft. in length, weigh approximately 500,000 lb. The turbine locomotive is expected to develop 3,000 hp. and attain speeds of over 100 m.p.h. Fred G. Gurley, president of the Santa Fe, has pointed out that it will burn more oil than the Diesel locomotive, but said "it is reasonable to expect that a cheaper fuel can be used." In addition to lower fuel costs, he added that maintenance and repair costs are expected to be less, since the turbine has only rotating parts which are less subject to wear than other types of engines having reciprocating parts.

[2] Delivery scheduled for this year.

[3] To cost $1,500,000.

[4] Deliveries to start late this year.

[5] Deliveries to start in July at initial rate of about 80 cars a day.

[6] To be equipped with Timken roller bearings and to cost about $4,200,000.

NOTE:—Federal Judge Michael Igoe, in Chicago, on January 17 authorized the Chicago, Rock Island & Pacific to purchase four de luxe, three-car, air-conditioned, suburban units and two 1,500-hp Diesel-electric passenger locomotives for use in suburban service between Chicago and Joliet, Ill.

January 20 modifications in interchange Rules 1 and 2 which are designed to reduce empty mileage and loss of car days under certain conditions and be effective during the present emergency and until rescinded.

The new policy to be followed by all roads applies to the handling of bad-order plain box and automobile cars, including those received on Car Service Division orders and not yet accepted in interchange, but not including automobile rack and parts cars and ventilated box, is as follows:

1—Plain box or automobile cars, empty on line, at other than a junction point with owning railroad having defects which render them unfit for loading shall not be carded to home shops when they can be made serviceable for rough freight or better at a cost for body repairs (exclusive of repairs to couplers, draft rigging and air brakes) not to exceed $100 for labor and material.

2—Plain box or automobile cars, empty on line, at a junction point with owning railroad (either direct physical connection or through an intermediate belt or switching road) having defects which render them unfit for loading shall not be carded to home shops when they can be made serviceable for merchandise or better at a cost for body repairs not to exceed $50 for labor and material (exclusive of repairs to couplers, draft rigging and air brakes) and when it is not neccessary to order repair material from owners.

3—Box-car movement orders issued by the Car Service Division require that cars applied on such orders be serviceable for loading. Cars applied on such orders shall, so far as practicable, be inspected by mechanical department forces of originating roads and those not suitable for loading should not be applied.

4—Plain box or automobile cars shall not be carded home as unfit for loading account requiring repairs in excess of amounts specified in Items (1) and (2), until personally inspected and authorized by the car foreman.

Bureau of Safety 1946 Report on Equipment Inspections

THE annual report of Director S. N. Mills of the Interstate Commerce Commission's Bureau of Safety for the fiscal year ended June 30, 1946, is a 35-page document, which set forth in the usual form the results of inspection of safety-appliance equipment on railroads together with information on hours-of-service records of employees, installation of signaling facilities, investigation of accidents and other activities of the bureau.

During the year under review, 1,203,408 freight cars, 27,840 passenger-train cars and 14,580 locomotives were inspected, as compared with the inspection of 1,414,674 freight cars, 30,198 passenger-train cars and 17,314 locomotives in fiscal 1945. Of the 1946 total, 3.2 per cent of the freight cars, 4 per cent of the passenger-train cars and 5.4 per cent of the locomotives were found to be defective, as compared to the respective 1945 figures of 3.18 per cent, 3.15 per cent and 3.88 per cent.

Air brakes checked on 2,760 trains (consisting of 114,262 cars) prepared for departure from terminals were found operative on 114,141 cars, or 99.9 per cent. This percentage was attained, however, only after 1,757 cars having defective brakes had been set out, and repairs had been made to the brakes on 1,196 cars remaining in the trains. "These trains," the report observes, "had been prepared for departure yet when afterward tested by our inspectors, it was necessary to set out or to repair the brakes on the average 1.1 cars per train." Similar tests on 1,406 trains arriving at terminals with 73,672 cars showed that the air brakes were operative on 98 per cent of the cars, and that an average of approximately one car per train was not controlled by power brakes.

"The annual reports of the past several years mentioned use by certain carriers of devices designed to make lock blocks on tightlock couplers inoperative, to compensate for defects in the coupler which were productive of undesired separation of trains," the report continued. "Tightlock couplers which are now being manufactured are of a modified design, which is intended to avoid accidental separation, and couplers of the former designs which are still in service are being modified to conform to the new design."

According to the report, 372 reporting railroads and private car lines which collectively own 2,144,725 freight cars, have equipped a total of 1,330,581 such cars with power brakes in compliance with an I. C. C. order of September 21, 1945, which require the installation of such brakes by January 1, 1949, on all cars used in freight service, except those equipped with passenger-car brakes. The breakdown of the figures shows that 65.3 per cent of the railroad-owned cars were equipped as of last June 30, but only 39.3 per cent of the cars owned by private car lines.

"There has been continued cooperation with the Association of American Railroads with respect to tests of geared hand brakes," the report said. "Twelve types of vertical-wheel geared brakes and four types of horizontal-wheel geared brakes have been certified by that association as meeting its specifications. Final action on others is pending."

Chesapeake & Ohio to Test Car Heating Systems

IN the process of selecting the heating system for the 284 passenger cars now on order with the Pullman-Standard Car Manufacturing Company the Chesapeake & Ohio has arranged for a directly comparative test of two heating systems. C. & O. passenger car built in 1941 is being fitted for the test by Pullman-Standard. In one half of the car will be installed the Vapor heating system of the Vapor Car Heating Company, utilizing a newly developed cycle-modulation control which controls the physical temperature of the piping itself and avoids under-runs and over-runs of heating cycles.

The other half of the car will be fitted with the electronic air-conditioning control of the Minneapolis-Honeywell Regulator Company in which, aside from the employment of a Wheatstone-bridge type of temperature control, is included a heat exchanger from which heat of the steam is transferred to a non-freezing liquid which is pumped through the radiators. This makes it possible to have the heating surface at a temperature only high enough to compensate for the heat lost through the walls of the car.

Both systems will be employed to furnish heat through radiant side-wall panels and radiant floors. Decision as to the heating equipment to be selected for the new passenger rolling stock will depend upon the performance of the two types during the test. The overhead heating arrangements will follow regular practice except for the controls.

Santa Fe Refrigerator—A Correction

THE convertible bunkers installed on the stainless-steel refrigerator car built by the Consolidated Steel Company for the Atchison, Topeka & Santa Fe are a product of Preco Incorporated. In the third paragraph of the description of this car beginning on page 53 of the February 1 *Railway Mechanical Engineer* the bunkers are incorrectly referred to as a product of Consolidated Steel.

Freight Car Builders Industry Advisory Committee

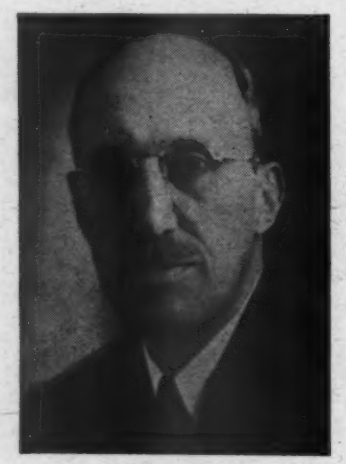
AT the joint meeting of the Steel Products Advisory Committee of the Civilian Production Administration with a group of executives of the steel industry at Washing, D. C., on January 10, the following were appointed to serve on the Freight Car Builders Industry Advisory Committee: W. W. Kelly, general purchasing agent, Atchison, Topeka & Santa Fe; R. L. Gillispie, Bethlehem Steel Company; F. A. Livingston, Ralston Steel Car Company; R. D. Long, director, purchases and stores, C. B. & Q.; A. C. Mann, vice-president, purchases and stores, Illinois Central; Ernest Murphy, Pressed Steel Car Company; Ferdinand Schmitz, Pacific Car & Foundry Co.; R. G. Setzekorn, American Refrigerator Transit Company; G. A. Steuber, Despatch Shops; A. Van Hassel, Magor Car Corporation; R. A. Williams, American Car and Foundry Company; H. Altschul, General American Transportation Corporation; W. M. Barker, Pullman-Standard Car Manufacturing Company; K. L. Brenner, purchasing agent, Wabash; Wesley A. Clem, purchasing agent, Reading; A. N. Crenshaw, purchasing agent, Great Northern; R. D. Cummings, purchasing agent, Delaware & Hudson; D. C. Curtis, chief purchasing officer, Chicago, Milwaukee, St. Paul & Pacific; D. R. Elmore, Fruit Growers Express Company; J. S. Fair, Jr., purchasing agent, Pennsylvania; K. C. Gardner, Greenville Steel Car Company, and F. C. Holton, purchasing agent, Virginian.

The car builders advisory committee was established to work in conjunction with the steel branch of the C. P. A. section of the Office of Temporary Controls in "channelling" steel to the production and repair of domestic freight cars.

Supply Trade Notes

FAIRBANKS, MORSE & CO.—*John S. King*, assistant manager of the Railroad division, Fairbanks, Morse & Co., with headquarters at Chicago, has been appointed manager of the company's Chicago branch. He succeeds *Frank V. Roy*, who retired on March 1.

John S. King started with the company as a student in the Beloit plant where he assembled and tested pumping equipment and Diesel engines. In 1921 he was transferred to the Indianapolis works, building electric motors and generators. A year



John S. King

later he joined the sales force at the Chicago branch, working as territorial representative on pumping equipment until, in 1930, he was appointed manager of the Pump department of that branch. In 1937 he was appointed manager of the company's New Orleans branch. Later in 1945 he was recalled to the executive staff at Chicago where he was, successively, manager of the Pump division and assistant manager of the Railroad Division.

◆

HAYES MANUFACTURING CORPORATION; AMERICAN ENGINEERING COMPANY.—Hayes Manufacturing Corporation, Grand Rapids, Mich., has purchased the American Engineering Company and its subsidiaries, which will continue to operate under the American Engineering Company name. New officers of American Engineering are as follows: *Rensselaer W. Clark*, president, general manager and director of Hayes Manufacturing for the past five years, has been elected president, retaining his headquarters at Grand Rapids; *Edgar Washburn* has been elected vice-president and general manager, and *J. S. Bennett*, associated with American Engineering since 1919, has been reelected vice-president.

◆

KENNAMETAL, INC.—Kennametal, Inc., Latrobe, Pa., has added the following to its staff of application engineers: *A. V. Andrews* and *John L. Sullivan*, with headquarters at Pittsburgh, Pa.; *Gerald Bogner* at Cleveland, Ohio; *Charles R. Demmitt, Jr.*, at Chicago; *Robert Karakoosh* at Springfield, Mass., and *Walter C. Lavers* and *Joseph F. Liebscher* at the Los Angeles, Calif., office. *Leo J. Perrette*, formerly on the staff of application engineers, has been appointed a representative in the Cincinnati, Ohio, district, with headquarters at 2162 Gilbert avenue. *Harry W. Bearfoot*, who was recently appointed a representative at the Pittsburgh office, has been transferred to a newly opened office at 528 White building, Buffalo, N. Y., where he will serve as tool engineer and representative.

◆

H. K. PORTER COMPANY.—*Colonel G. deFreest Larner* has been elected a director of the H. K. Porter Company. Colonel Larner has been assistant to the president for several years. *Clarence R. Abitz* has been appointed general manager of the McKees Rocks works of the American-Fort Pitt Spring division of the Porter Company. *Roland E. Nelson* has been appointed manager of the Chicago office of the H. K. Porter Company. Mr. Nelson was formerly sales engineer, serving the St. Louis, Mo. territory.

◆

CHICKSAN COMPANY.—The appointment of Chicksan Company, Brea, Cal., as exclusive distributors of the Okadee gasoline loading rack valve has just been announced by Lee J. Laird, vice-president and sales manager of the Chicksan Company.

◆

AMERICAN K.A.T. CORPORATION.—*S. O. Taylor* and *C. T. Reed* of Taylor-Reed & Co., 915 Olive street, St. Louis 1, Mo., have been appointed sales engineering representatives, Railroad Division, American K.A.T. Corporation.

◆

JOSEPH T. RYERSON & SON.—*Charles S. Hegel* has been appointed manager of the Stainless Steel division, and *John W. Queen* as manager of the Alloy Steel division of Joseph T. Ryerson & Son, both

John W. Queen

with headquarters in Chicago. *G. Van Dyke*, manager of the Special Steels division, has retired. Mr. Van Dyke was associated with the Ryerson organization for 30 years.

Charles S. Hegel joined the Ryerson company in 1928, spending three years at the Chicago plant and four years at the Milwaukee, Wis., plant, where he was in charge of the Special Steels department.

Charles S. Hegel

He returned to Chicago in 1945 as manager of the Special Steels department.

John W. Queen joined the Ryerson sales staff in 1933 at New York and was appointed manager of the Alloy Steel department at New York in 1934.

◆

ENOZ CHEMICAL COMPANY.—*Vance C. Woodcox* has been elected president of the Enoz Chemical Company, with headquarters at Chicago.

◆

ELECTRIC SERVICE MANUFACTURING COMPANY.—*Ray Cole* has been placed in charge of the Boston, Mass., office of the Electric Service Manufacturing Company to succeed *J. B. Miller*, who has been appointed manager of the New York office.

◆

OKONITE COMPANY.—*R. S. Keefer*, formerly sales manager of the Okonite Company, Passaic, N. J., has been appointed vice-president in charge of sales. Mr. Keefer will be responsible for directing all sales activities of the Okonite Company, its Hazard insulated wire works division and those of its affiliate, the Okonite-Callender Cable Company. *F. E. Bankwitz* has been appointed manager of the Washington, D. C., office, to replace *R. Soutter*, who has been granted a leave of absence, effective March 1. *D. W. Nurse*, formerly of the San Francisco, Calif., office, has been appointed manager of the Portland, Ore., office, and *W. R. Van Steenburgh* has been appointed manager of the New York territory, with headquarters at 501 Fifth avenue. Mr. Van Steenburgh will continue as manager of the company's light and power department.

ALLIS-CHALMERS MANUFACTURING COMPANY. *James D. Greenstward*, who has been associated with the Allis-Chalmers Manufacturing Company, Milwaukee, Wis., since 1922, has been appointed assistant to William C. Johnson, vice-president of the general machinery division. *Charles F. Codrington*, assistant to the manager, has been

appointed sales manager of the blower and compressor department of the Allis-Chalmers Manufacturing Company, Milwaukee, Wis., to succeed *A. E. Caudle*, who has resigned.

◆

UNITED STATES STEEL SUPPLY COMPANY.—*Alfred G. Findlay* has been appointed manager of the stainless-steel-sales division of the United States Steel Supply Company (a subsidiary of the United States Steel Corporation), with headquarters at 1319 Wabansia avenue, Chicago.

◆

BRUBAKER TOOL COMPANY.—*Fred C. Helms, Jr.*, formerly vice-president in charge of eastern division sales for the Republic Drill & Tool Co., has been appointed manager of railway sales for the Brubaker Tool Company, with headquarters in the Socony-Vacuum building, 79 East Van Buren street, Chicago 5.

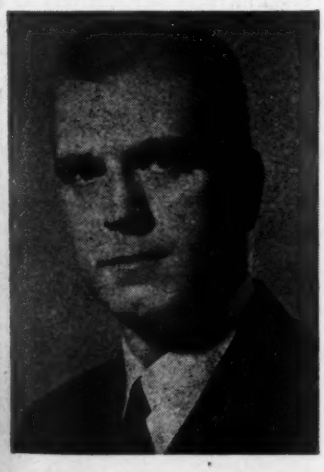
◆

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—*Richard T. Coyne*, formerly eastern district manager of the H. K. Porter Company, has joined the Pullman-Standard Car Manufacturing Company as sales agent in the New York office.

◆

AMERICAN CAR AND FOUNDRY COMPANY.—*T. C. Ballou* has been appointed manager of welded products sales, in charge of sales of weldments and welded products other than tanks, pressure vessels and cars of welded construction. *F. H. Eaton*, sales engineer, and *H. J. Russell*, sales agent, have been appointed assistants to the vice-president in charge of sales, with headquarters in New York.

J. C. Ballou is a graduate of Western Reserve University (1935). He became an employee of the Canton Tank Car Company of Cleveland, Ohio, in that year and, in 1936, joined American Car and Foundry as sales agent in the Cleveland office. During World War II he served in the United States Naval Reserve, returning to American Car and Foundry in November, 1945. In December, 1946, he was transferred to the New York sales office as a sales agent in the tank car department.



J. C. Ballou

F. H. Eaton is a graduate of the Newark Academy and Williams College. After graduation from the latter in 1922, he took the shop-training course at the American Car and Foundry, Berwick, Pa., plant, completing the course in 1925. For the next ten years he worked in the engineering department on various phases of passenger freight, mine and industrial car building and subsequently served as sales engineer in the company's sales offices in Pittsburgh, Pa., St. Louis, Mo., Washington, D. C., and New York.

F. H. Eaton

H. J. Russell is a graduate of the University of Illinois (1939). He joined American Car and Foundry as a sales agent in the Cleveland district sales office in 1939 and during World War II served with the U. S. Navy for 2½ years. Following his release from active duty in 1945, he resumed his former position at the Cleveland office. In February, 1946, he was transferred to the general sales office in New York.

Blackstone

H. J. Russell

◆

KERITE COMPANY.—*J. Warren Young*, eastern railway sales manager of the Kerite Company since 1928, has retired.

J. Warren Young entered the railway field in 1896, when he joined the Central of New Jersey. He subsequently served with the Delaware, Lackawanna & Western, the New York, Susquehanna & Western and the Erie. He resigned from the Erie as chief signal inspector to join the railway sales department of the Kerite Insulated Wire & Cable Co., predecessor of the Kerite Company. Mr. Young is a member of the Signal and Communication sections of the Association of American Railroads.

◆

MAGNOLIA AIRCO GAS PRODUCTS COMPANY.—*J. F. Pryor* of Houston, Tex., has been elected president of the Magnolia Airco Gas Products Company, to succeed *W. A. Sherman*, who will continue as a director of the firm. *R. A. Merritt*, former general manager of sales at Houston and *J. D. Schwartz*, former branch manager at El Paso, Tex., have been appointed vice-presidents. *R. F. Crow*, former executive vice-president, will continue as a director.

◆

JOHNS-MANVILLE CORPORATION. — Construction of the second and main unit of a research center near Bound Brook, N. J., has been started by the Johns-Manville Corporation, according to Dr. C. F. Rassweiler, vice-president for research and development. The first unit, a product development laboratory and 10 experimental factories in one building 572 ft. long and 135 ft. wide, is nearing completion and will be in use in the early part of 1947. It was started in September, 1945. The second unit consists of a three-story research building, 350 ft. long and 67 ft. wide, and a mechanical and service building 288 by 100 ft. It is planned that ultimately the research center will be a group of five buildings on a 93-acre plot across the Raritan river from the Johns-Manville plant at Manville, N. J.

◆

KOPPERS COMPANY.—*D. A. Mitchell* has been appointed general superintendent of plants and operations of the Wood Preserving division of the Koppers Company, Pittsburgh, Pa., and *E. R. Snodgrass* has been appointed chief engineer.

◆

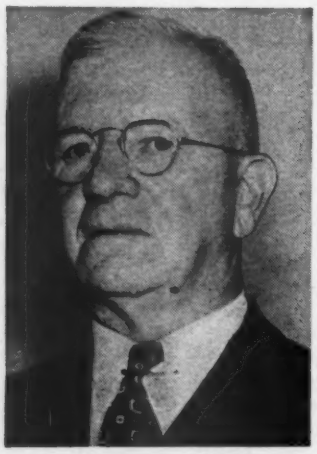
BALDWIN LOCOMOTIVE WORKS.—*Frank B. Powers* has been appointed assistant to vice-president—operations, for the Baldwin Locomotive Works, to work mainly in connection with Diesel-electric locomotives.

Frank B. Powers is a graduate of the University of Illinois (1926). He was engineering manager for the Transportation and Generator division of the Westinghouse Electric Company until 1945 and subsequently served as executive vice-president of Great American Industries, Inc.

Frank B. Powers

BUDD COMPANY.—*Clyde C. Elmes* has been appointed service manager of the Budd Company's railway division.

Clyde C. Elmes, with Budd since 1937, is a graduate of Purdue University where



Clyde C. Elmes

he specialized in railway mechanical engineering. He has served in the mechanical departments of several railroads and for twelve years was general superintendent of locomotive construction for the Baldwin Locomotive Works. He was project manager and assistant to the director of research of the Association of American Railroads' division of engineering research.

◆

AMERICAN LOCOMOTIVE COMPANY.—The American Locomotive Company has completed a transition from the primary function of constructing custom-designed steam locomotives to the mass production of a completely new line of Diesel-electric locomotives, according to Robert B. McColl, president. Organizational changes, he said, have been made to meet the new and accelerated tempo of railroad motive-power requirements.

A new administrative committee was appointed by Mr. McColl to plan, direct and coordinate all company activities. Members of the committee are *Perry T. Egbert,*

Perry T. Egbert

William L. Lentz, William S. Morris, Norman C. Naylor, vice-presidents; *Herman Press,* treasurer; and *James D. Vaughan,* comptroller. *Duncan W. Fraser,* chairman of the board of directors, will serve, ex officio, as a member of the committee, which will be presided over by Mr. McColl.

Perry T. Egbert, who is also a director, has been with Alco since 1920. He will head all Diesel-electric and steam locomotive activities, including locomotive spare parts and marine and stationary Diesel engines, from his headquarters at the Schenectady, N. Y., plant.

William S. Morris, a director, who has been active in the locomotive field since 1922, has been placed in charge of the other three divisions: Alco Products, Railway

William S. Morris

Steel-Spring, and the Canadian affiliate, the Montreal Locomotive Works. His headquarters will be in New York.

Hunter Michaels will continue as director of the Railway Steel-Spring division and *Hugh M. Corrough* will remain director of the Alco Products division. Supervision of the Montreal Locomotive Works remains with its executive vice-president, *Sir Frederick Carson* of Montreal.

Norman C. Naylor, in addition to being a

Norman C. Naylor

member of the policy committee and the board of directors, will direct and coordinate the sales of all Alco divisions, with headquarters in New York. Mr. Naylor has been associated with Alco and its predecessor companies since 1895, and has been vice-president in charge of western regional sales since 1930.

William A. Callison has been elected vice-president in charge of western regional sales. His headquarters will be in Chicago and he will be in charge of sales offices at Chicago, St. Louis, Mo., St. Paul, Minn.,

William A. Callison

and San Francisco, Calif. *William E. Corrigan* has been elected vice-president in charge of eastern regional sales, with headquarters in New York. He joined Alco in 1909 and was elected vice-president in 1937. *Frank J. Foley,* formerly vice-president in charge of sales, has been appointed a consultant.

◆

AMERICAN STEEL FOUNDRIES.—*Fritz B. Ernst,* vice-president in charge of sales of the American Steel Foundries, with headquarters at Chicago, retired on January 31. Also retired on that date was *Archibald W. McLaren,* vice-president in charge of the company's New York office. *E. M. Van Winkle,* eastern sales manager of American Steel Foundries, has been elected vice-president, with headquarters as before in New York.

E. M. Van Winkle is a graduate of Purdue University (1921). After graduating he joined American Steel Foundries as a special apprentice. He later served in various capacities; was appointed

E. M. Van Winkle

sales agent at New York in 1939, and assistant vice-president in 1940. During World War II he was assigned special duties at Washington, D. C., and later

this isn't the Half of it!

What a glutton for punishment the Chilled Car Wheel is! That's why we call him "The Tough Guy". He has to be tough. He keeps the nation's freight rolling.

It is our business to make sure that his service life is a long one. AMCCW members put him through a long series of workouts and work checks — gruelling impact tests . . . careful flange dimension measurements . . . wheel surface inspections . . . reviews of casting records — not to mention temperature tests from cupola to cleaning room.

We at AMCCW never let up in our study of wheel performance . . . in our search for new worthwhile developments to introduce into modern wheel making . . . in our devising of more and more severe tests to assure long and safe chilled car wheel life.

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ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

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American Car & Foundry Co. • Canadian Car & Foundry Co. • Cleveland Production Co. Griffin Wheel Co. • Marshall Car Wheel & Foundry Co. • Maryland Car Wheel Co. • New York Car Wheel Co. • Pullman-Standard Car Mfg. Co. • Southern Wheel (American Brake Shoe Co.)

4966

was transferred to the company's general office at Chicago as chairman of the priorities committee. Mr. Van Winkle returned to New York in 1944 as eastern sales manager in charge of the New York and Philadelphia, Pa., offices.

◆

AMERICAN BRAKE SHOE COMPANY.—*Stephen S. Conway*, assistant vice-president in the sales department of the Brake Shoe & Castings division of the American Brake

Stephen S. Conway

Shoe Company, has been appointed vice-president in that department with headquarters in Chicago.

Stephen S. Conway joined American Brake Shoe in 1912 and has served in the sales department of the Brake Shoe & Castings division since 1929. *Ralph L. Robinson*, district sales manager of the division, has been appointed assistant vice-president in the sales department, to succeed Mr. Conway.

◆

CLARK EQUIPMENT COMPANY.—*E. M. Schultheis*, formerly manager of sales, automotive division, has been appointed manager of sales of the Clark Equipment Company. *Leo A. Bixby*, formerly man-

E. M. Schultheis

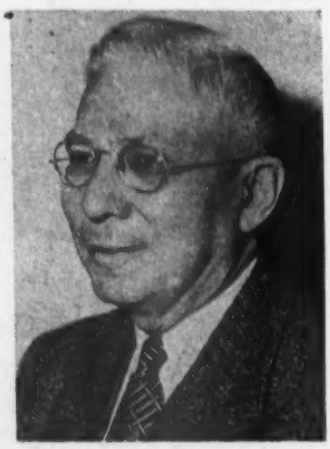
ager of engineering, automotive division, has been appointed manager of engineering of the company, Tructractor division. Mr. Schultheis will have on his staff *Truman F. Schrag*, sales manager, Automotive division; *James H. W. Conklin*, sales manager, Tructractor division; *James S. Hearons*, sales manager, Railway division, and *L. W. Weaver*, sales manager, Tool division. *Edwin B. Ross*, vice-president in charge of sales for Clark Equipment, and *Ezra W. Clark*, vice-president and general manager of the Tructractor division, have retired.

◆

NATIONAL MALLEABLE & STEEL CASTINGS CO.—*Robert D. Sowers* has been appointed to the industrial sales division of the Sharon, Pa., plant of the National Malleable & Steel Castings Co. Mr. Sowers joined National Malleable in 1936. He served in the United States Navy during world war II and returned to the company in April, 1946.

◆

REYNOLDS METALS COMPANY.—*Edward A. Sipp*, whose appointment as manager railway division of the Reynolds Metals Company, with headquarters at Chicago, was reported in January, was born at Watertown, Wis., and is a graduate of the University of Wisconsin. For several years Mr. Sipp served as a civilian engineer with the United States Army Air Corps. Later he joined the Burgess Battery Company at Madison, Wis., where his work consisted of company reorganization, research and the development and marketing of new products. He subsequently be-



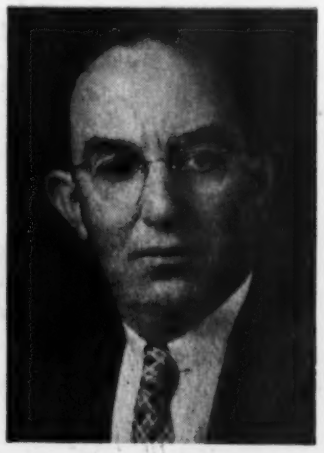
Edward A. Sipp

came associated with the Pyle-National Company, Chicago, holding for 13 years the position as manager research department. Prior to joining the Reynolds Metals Company in July, 1946, he was contact executive for the Gustin-Bacon Manufacturing Company at Chicago, handling engineering and sales promotion in heavy industries, particularly railroads, machinery and aircraft. Mr. Sipp holds patents in acoustic and air-distribution systems, lighting equipment, and electrical control.

◆

W. F. HEBARD & CO.—*Jack W. Cannon* has been appointed railroad sales representative for W. F. Hebard & Co., in the Chicago area. W. F. Hebard, manufacturers of shop-mule tractors also are distributors for the Ross Carrier Company, the Hughes-Keenan Company, the Brookville Locomotive Works, the Elizabeth Iron Works, and the Electric Wheel Company.

WATERHOUSE & CO.—*W. E. Corr*, formerly superintendent of the car department of the Seaboard Air Line, has been appoint-



W. E. Corr

ed southeastern sales representative of Waterhouse & Co., New York.

W. E. Corr was with the Seaboard for 34 years. He started in the Portsmouth, Va., shops as timekeeper and piecework inspector and subsequently became assistant foreman of shops, general foreman, master car builder, and superintendent of the car department. He retired from the Seaboard in May, 1946.

◆

NATIONAL TUBE COMPANY.—*G. Lawton Johnson* has been appointed assistant general manager of sales of the National Tube Company, a subsidiary of the United States Steel Corporation. He will handle the sale of products manufactured at the Christy Park works, McKeesport, Pa.

◆

LEWIS BOLT & NUT CO.—*Anthony C. Fecht* has been appointed manager of rail-

Anthony C. Fecht

way sales for the Lewis Bolt & Nut Co. Mr. Fecht has been associated with the company since 1928.

◆

ST. LOUIS CAR COMPANY.—*George L. Kippenberger*, vice-president and assistant general manager of the St. Louis Car Company, with headquarters at St. Louis, Mo., has retired, following 45 years of service. He will continue, however, as director and

HIGH SPEED FREIGHT DEMANDS EMPHASIZE THE NEED FOR . .

MODERN POWER

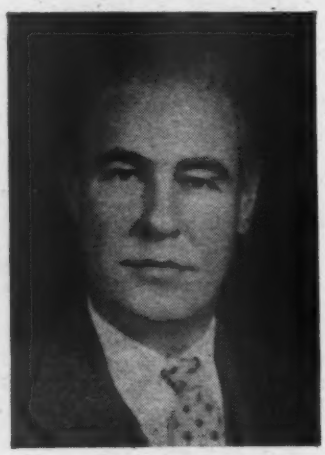
Today's freight demands can only be met through a maximum of operating efficiency . . . operating efficiency that is backed up by MODERN Motive Power, capable of hauling increased loads at higher speeds. Reduced running time means increased availability . . . and increased availability means increased revenues. « Lima-built Modern Steam Locomotives have shown what Modern Steam Power can do to decrease running time and increase availability and freight revenues.

LIMA LOCOMOTIVE WORKS LIMA LOCOMOTIVE WORKS INCORPORATED **INCORPORATED, LIMA, OHIO**

consultant. *Elmer C. Wrausmann*, assistant to vice-president, has been advanced to vice-president in charge of sales. *Chester C. Bleikamp*, executive assistant, has been promoted to vice-president, specializing in production planning and coordination.

◆

DOMINION BRAKE SHOE COMPANY.—*Kenneth T. Fawcett*, assistant general purchasing agent of the American Brake Shoe Company since 1944, has been appointed vice-president of the Dominion Brake Shoe Company, a Canadian subsidiary. Mr. Faw-



Kenneth T. Fawcett

cett was born in Calgary, Alberta, and was graduated from Phillips Andover Academy in 1930 and Yale University in 1934, in which year he joined American Brake Shoe.

◆

AUTOMATIC TRANSPORTATION COMPANY.—*Alva E. Radcliffe* has become associated with B. I. Florey, Cleveland representative of the Automatic Transportation Company.

◆

TUBE TURNS (INC.).—*Donald A. MacNeil* has joined the sales staff of the forging division of Tube Turns (Inc.), Louisville, Ky., with headquarters in Chicago. Mr.

Donald A. MacNeil

MacNeil, was vice-president of the Kelly Steel Works, Inc., Chicago, when he resigned to join Tube Turns.

◆

CHICAGO RAILROAD SUPPLY COMPANY.—The offices of the Chicago Railroad Supply Company have been moved to 215 West Ohio street, Chicago 10.

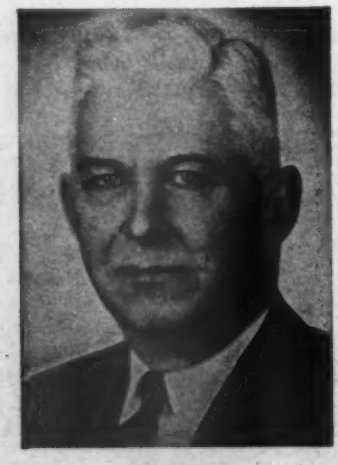
WESTINGHOUSE AIR BRAKE COMPANY.—*Carl H. Beck*, general sales manager of the Westinghouse Air Brake Company at Wilmerding, Pa., has been elected a vice-president of the company. *J. B. Hull* has been appointed assistant district manager of the San Francisco, Calif., office; *J. Alan Campbell*, district engineer also at San Francisco, and *S. Jory*, manager of the export division, with headquarters at the general office in Wilmerding, Pa. *T. G. Myles* and *R. M. Beswick* have been appointed representatives at Topeka, Kan., and Washington, D. C., respectively.

Carl H. Beck is a graduate of the Pennsylvania State College, where he received the degree of B.S. in 1905 and the degree of M.E. several years later. He entered the employ of the Westinghouse Air Brake Company in June, 1905, as a special apprentice, serving in a number of shop and field assignments until 1907 when he be-

Carl H. Beck

came steam road inspector at the St. Louis, Mo., offices of the company. In 1909 he became a representative of the Westinghouse Traction Brake Company at St. Louis, and in 1919 a special representative of the former Safety Car Devices Company at Wilmerding. He was appointed assistant eastern manager of the Westinghouse Air Brake Company, with headquarters in New York, in 1920; eastern manager in 1932, and general sales manager at Wilmerding on January 1, 1938.

J. B. Hull joined Westinghouse Air Brake in 1920 as a special engineer and



J. B. Hull

served in various engineering capacities until 1929, when he was transferred to the San Francisco office as assistant district engineer. He was appointed district engineer in 1935.

J. Alan Campbell joined the company as a special apprentice in 1936. He was transferred to the San Francisco office in 1937 as mechanical expert, appointed engineer

J. Alan Campbell

in 1942, and assistant district engineer in 1946.

S. Jory joined Westinghouse Air Brake in 1924 as a special apprentice. He was engaged in general engineering until his

S. Jory

transfer to the export division in 1928, where he served in engineering and sales capacities until his recent appointment.

◆

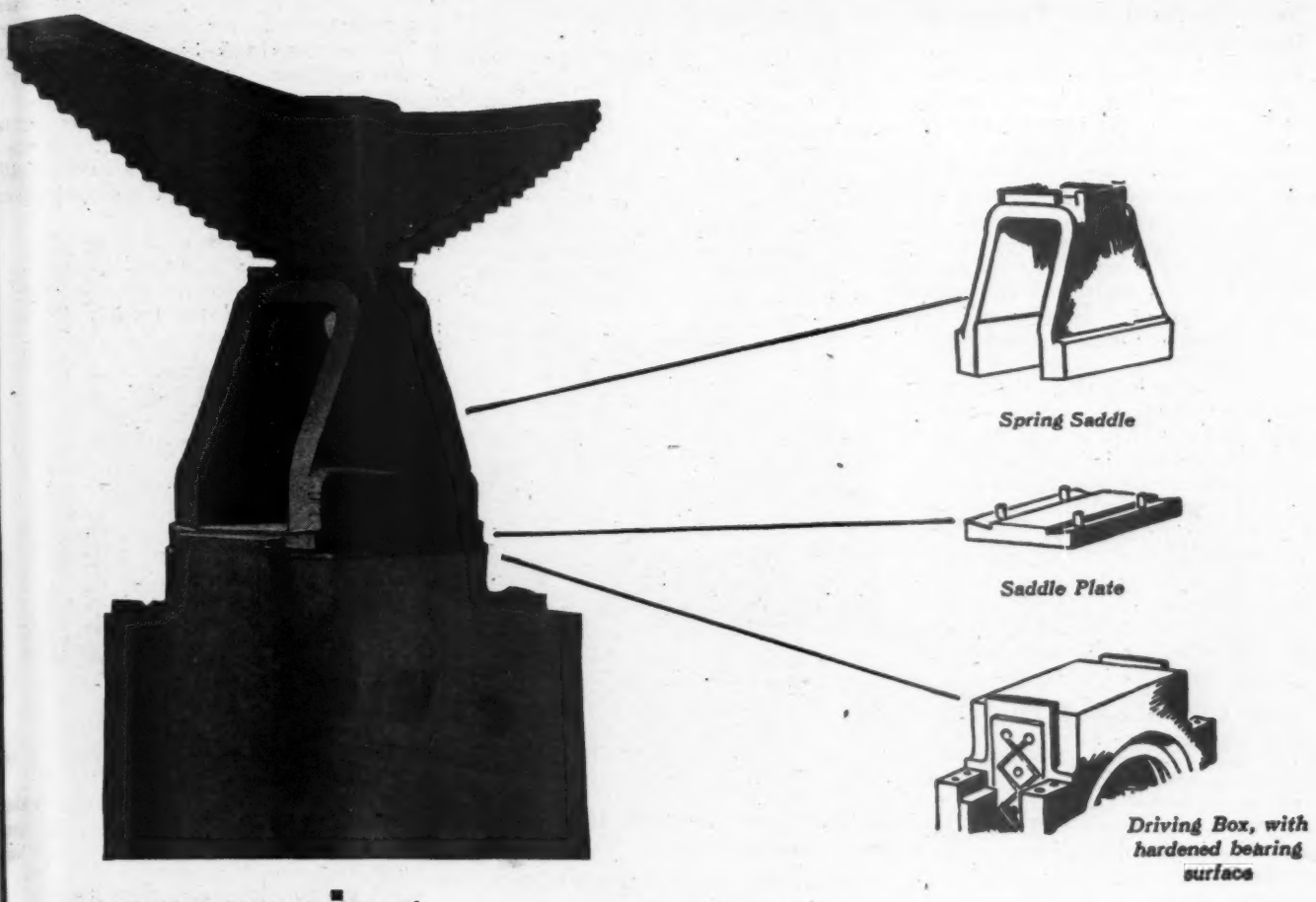
OPTIMUS DETERGENTS COMPANY.—*Clarence M. Smith* of Lancaster, Pa., has been appointed field service representative, Central Pennsylvania, of the Optimus Detergents Company, Matawan, N. J.

◆

SPRING PACKING CORPORATION.—*Walter G. Gibbs* has been elected executive vice-president of the Spring Packing Corporation, Chicago. Mr. Gibbs has been associated with the company for 22 years.

◆

LUMINATOR, INC.—*Henry J. Van Dellen* has been added to the staff of Luminator, Inc., Chicago. Mr. Van Dellen was formerly general car inspector of the



announcing

THE FRANKLIN *Frame-Guided* SPRING SADDLE

PREVENTS FAILURE OF LOCOMOTIVE SPRING RIGGING. Reduces maintenance costs by keeping spring saddle, spring, and spring hangers in line with frame, eliminating twisting and bending.

GIVES SMOOTH ACTION ON CURVES. Absorbs excessive inertia forces from driving-box lateral without restricting lateral displacement.

With this design, driving boxes are free to move laterally with the axle and driving wheels without any corresponding lateral movement of the spring saddles. Saddles are supported on saddle plates which allow the driving box to slide laterally while saddle, spring and rigging maintain strict alignment with frame of locomotive at all times. Twisting, bending or tilting of saddles, fanning of springs, and bending of hangers are eliminated.

Records on a group of locomotives equipped with this saddle show not one breakage during the same period in which three hangers per locomotive and one saddle per three locomotives were broken on a similar group equipped with conventional saddles.

Applicable to roller-bearing or plain-bearing driving boxes, new or existing locomotives.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK • CHICAGO • MONTREAL

STEAM DISTRIBUTION SYSTEM • BOOSTER • RADIAL BUFFER • COMPENSATOR AND SNUBBER • POWER REVERSE GEARS
AUTOMATIC FIRE DOORS • DRIVING BOX LUBRICATORS • STEAM GRATE SHAKERS • FLEXIBLE JOINTS • CAR CONNECTION

Advertisement

New Method for Cleaning Bull Rings

Removal of stubborn carbonized oil deposits from bull rings is often a troublesome problem in the railroad shop, but when Magnus 755 was tried out for the first time when it became available for commercial use after the war, it was found to do a satisfactory cleaning job.

This special carbon remover was developed for the Army Air Forces during the war. It is a neutral solvent cleaner with unusual wetting and emulsifying action which is completely harmless to all metals.

For cleaning bull rings, the working solution is made up of eight parts of Magnus 755 with a seal of two parts water to prevent loss of volatile ingredients at the cleaning temperature of 150°F. Rings are soaked in this solution 12-18 hours, then pressure rinsed with water. The only hand work ever required is the removal in some cases of a residual deposit which comes off easily with light brushing. Use of the Magnus Aja-Dip Cleaning Machine cuts the cleaning time to a few hours.

Easy Cleaning of Diesel Air Filters

Crankcase breather and compressor intake filters of the Vortex type, all impingement type filters and Air-Maze units are most readily and satisfactorily cleaned by the Magnusol method.

A solution of one part Magnusol to six parts kerosene or safety solvent is used to immerse the filter elements. A two minute dip is ample. Elements are then drained and rinsed with water under pressure or with a steam gun, to be ready for drying and re-oiling.

Magnusol loosens the bond of the greasy dirt to the surfaces to be cleaned and forms a heavy emulsion with the rinsing water or steam, which carries off all dirt. Harmless to all materials of construction.

Lopping Off 80-90% of the Time for Railroad Cleaning Jobs

Even the most effective cleaners take too much time to do their work when inadequate agitation is employed. Comparing the limited kind of agitation obtained in a boiling vat with the dynamic, effective agitation provided by the Magnus Aja-Dip Cleaning Machine is easy. The still tank takes from six to eight hours to do a job on very dirty work (and calls for plenty of manual labor in the bargain). The Aja-Dip does a better job in 45 minutes or less and virtually eliminates any need for hand work.

The Magnus Aja-Dip Cleaning Machines move the work up and down IN the cleaning solution, rapidly and repeatedly. The solution reaches all parts of the work and also has a positive "shearing" action on the dirt impossible to obtain by any other method.

These machines are available in a wide range of capacities to handle parts of every description from the small units such as are involved in cleaning signal

elements, to complete diesel engine blocks. Used with the Magnus Cleaner best adapted to the cleaning job, they cut cleaning costs to the bone by radical reduction in labor, cleaning time and manual handling.

Effective Carbon Removal for Diesel Parts

Probably the most interesting application of Magnus 755 in the railroad shop is the way in which this carbon remover eliminates hand operations in all cleaning jobs on diesel engine parts. Even where a still soak tank is used, with #755 the soaking period is very short compared with that required by ordinary cleaners. The carbonized oil deposits are rapidly penetrated, and their bond with the metal loosened, so that they are readily flushed off with water or safety solvent.

Sludge Control for Oil-Fired Locomotives

Wherever heavy fuel oil is burned, the problem of sludge becomes a serious one. Unless definite steps are taken to prevent its formation, sludge causes all kinds of troubles due to clogged screens and lines, carbonized deposits in burner nozzles, excessive soot deposits in the firebox and needless smoking.

Magnus Clerex is an effective, highly economical treatment for heavy fuel oil which completely inhibits sludge formation. One pint per 1000 gallons of fuel oil is all that is required. Clerex is also used in cases where heavy sludge deposits have been allowed to accumulate in oil storage systems. One pint per 400 gallons of oil will effectively disperse these deposits.

MAGNUS Railroad Cleaners & Machines

MAGNUS CHEMICAL COMPANY · 77 SOUTH AVE., GARWOOD, N. J.

Service Representatives in Principal Cities

IN CANADA — MAGNUS CHEMICALS, LTD., 4040 RUE MASSON, MONTREAL 36, QUE.

Alton. He started his railroad career with the Chicago & North Western in 1922, and subsequently was associated with the Atchison, Topeka & Santa Fe, the General American Transportation Corporation and the Union Tank Car Company. He returned to the C. & N. W. in 1928, where he served as shop engineer in the development of car lighting, air conditioning, and modernization of railroad passenger cars.

◆

LUMINATOR, INC., OF CALIFORNIA.—*George W. Ledbetter* has been appointed district engineer of the recently formed

George W. Ledbetter

Luminator, Inc., of California. Mr. Ledbetter was formerly radio electronic engineer with the Douglas Aircraft Company, Santa Monica, Calif.

Obituary

JOSEPH DENNIS CLYDE, service representative for the Valve Pilot Corporation, New York, died on December 29, 1946. Mr. Clyde was 61 years old. He began his career in 1903 with the St. Louis, Iron Mountain & Southern (now part of the Missouri Pacific). In 1922 he became mechanical inspector of the Texas & Pacific. In 1944 he joined Valve Pilot.

◆

JOHN W. BRAY, a director of the Bullard Company, Bridgeport, Conn., died on January 4, after a long illness. Mr. Bray, who was 79 years old, joined Bullard as an apprentice in 1884. He was elected a director in 1930 and appointed vice-president in charge of sales in 1932.

◆

ROBERT D. HEFLIN, direct sales representative of the Gisholt Machine Company in charge of the branch office in Newark, N. J., died suddenly on January 23 at Memorial Hospital, East Orange, N. J. Mr. Heflin was born August 17, 1883. He became associated with the Gisholt Machine Company on February 27, 1911.

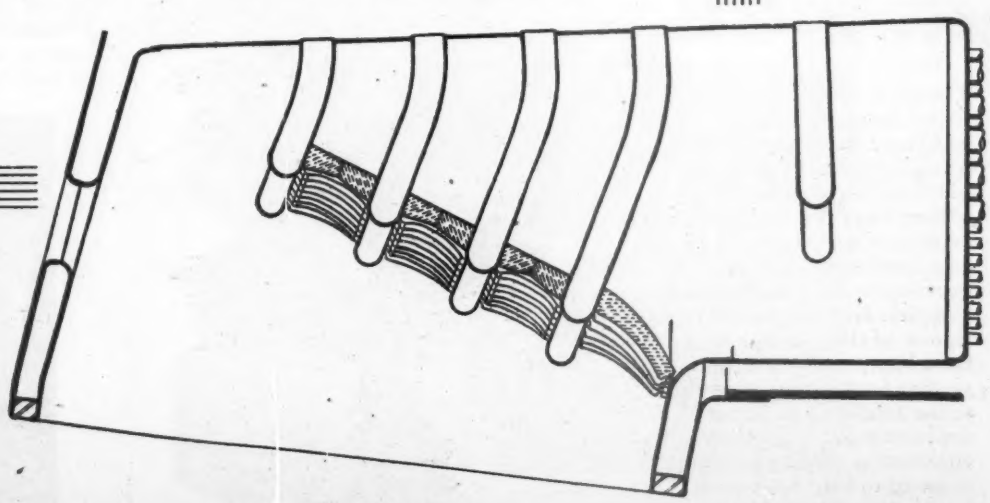
◆

WILLIAM A. BIERMAN, president of the O. C. Duryea Corporation, died on January 30, at his home in Pittsburgh, Pa. Mr. Bierman, who was 72 years old, started his career with the Pressed Steel Car Company. In 1904 he became secretary of the Standard Steel Car Company and, following the merger of Standard Steel with the Pullman-Standard Car Manufacturing Company in

Faster Evaporation

Located right in the path of the hot gases, Security Circulators are very effective elements for speeding evaporation. There is a continuous circulation of water from the side water-legs, through the circulators, over the top of the crown sheet.

At the same time the Security Circulators provide the most satisfactory type of support for a 100% brick arch.



Typical Installation in Coal-Fired Locomotive

AMERICAN ARCH COMPANY, INC.

NEW YORK • CHICAGO

SECURITY CIRCULATOR DIVISION

The merger of American Spiral Spring & Mfg. Co., and Fort Pitt Spring Co. has brought together two of the oldest spring manufacturers to form one of the *largest* spring producers in the country. This combined equipment and experience offers exceptionally complete facilities for the manufacture of all types of springs, from heavy coil and elliptic springs for cars and locomotives, to the smallest helical wire and flat springs for all purposes. Our engineering facilities are at your disposal to help solve your intricate spring problems.

AMERICAN-FORT PITT SPRING DIVISION
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EQUIPMENT

PORTER-BUILT *means* BETTER-BUILT

American-Fort Pitt Spring Division
H. K. PORTER COMPANY, Inc.
PITTSBURGH 22, PENNSYLVANIA
District Offices in Principal Cities

1934, he became a vice-president and assistant to the president of Pullman-Standard. He retired in 1938 but returned to business three years later as president of the Duryea Corporation.

◆

WILLARD SWARTLEY HARING, vice-president in charge of sales of the Alan Wood Steel Company of Conshohocken, Pa., died on January 7 at the Bryn Mawr (Pa.) hospital after a short illness following an operation. He was 60 years of age.

◆

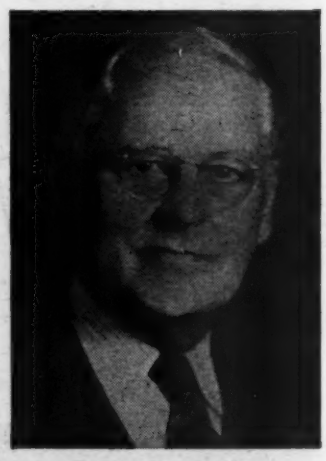
CHARLES B. CARR, formerly manager of the Cleveland, Ohio, branch sales office of the Gisholt Machine Company, died on January 8. He was 83 years old.

◆

ROBERT JAY BURROWS, a vice-president and director of the Clark Equipment Company, died suddenly of a heart attack on January 12, at Hollywood, Cal. Mr. Burrows had been associated with the Clark Company for more than 30 years. He was born on November 28, 1882, at Youngstown, Ohio. Following his graduation as a mechanical engineer from Clarkson College of Technology, at Potsdam, N. Y., he joined the Weston-Mott Axle Company at Flint, Mich. In 1913 he became chief engineer and general manager of the Lee & Porter Co., manufacturers of axles, at Buchanan, Mich. Following a short association with the American Gear Company, at Jackson, Mich., Mr. Burrows in 1915 joined the Clark Equipment Company, and shortly thereafter became a vice-president and director. He was the inventor of a new type motor-truck axle, which resulted in the formation of the axle division of the company. Mr. Burrows was also responsible for creation of the tractor and railway divisions.

◆

JOHN P. NEFF, who retired in 1946 after 32 years' service as vice-president in charge of engineering for the American Arch Company, died on January 17. Mr. Neff was born on May 2, 1874, at Fontaine, Ind.,



John P. Neff

and was a graduate in mechanical engineering from Purdue University in 1895. In the same year he joined the Chicago & North Western and, in 1902, was appointed master mechanic of the road's Western Iowa division. He joined the American Locomotive Equipment Company in 1904 and, in 1910 became engineer of tests and

Keep Flues Clean

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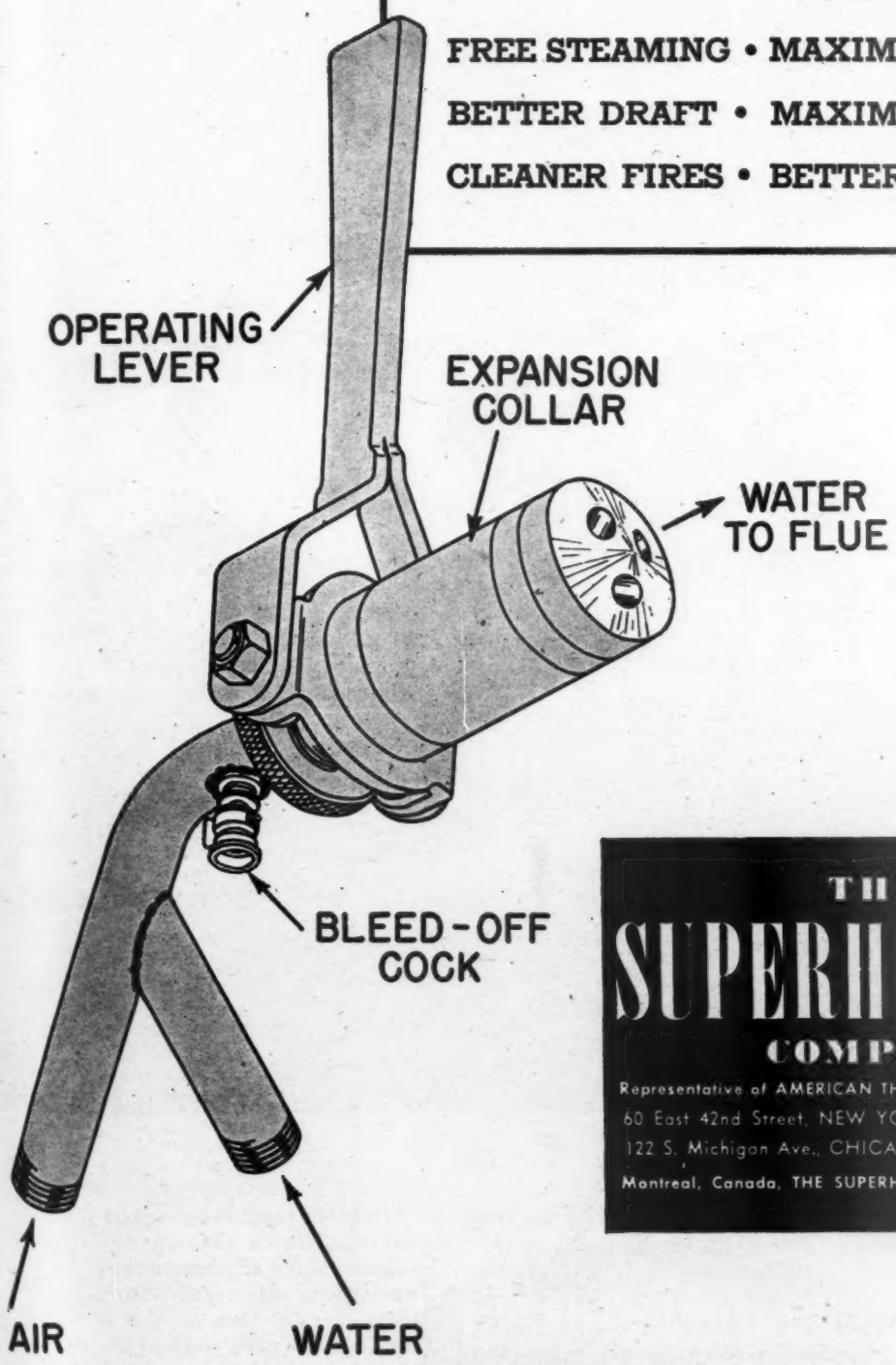
FREE STEAMING • MAXIMUM EVAPORATION

BETTER DRAFT • MAXIMUM SUPERHEAT

CLEANER FIRES • BETTER COMBUSTION



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Montreal, Canada, THE SUPERHEATER COMPANY, LTD.

This tool is used successfully by many railroads.

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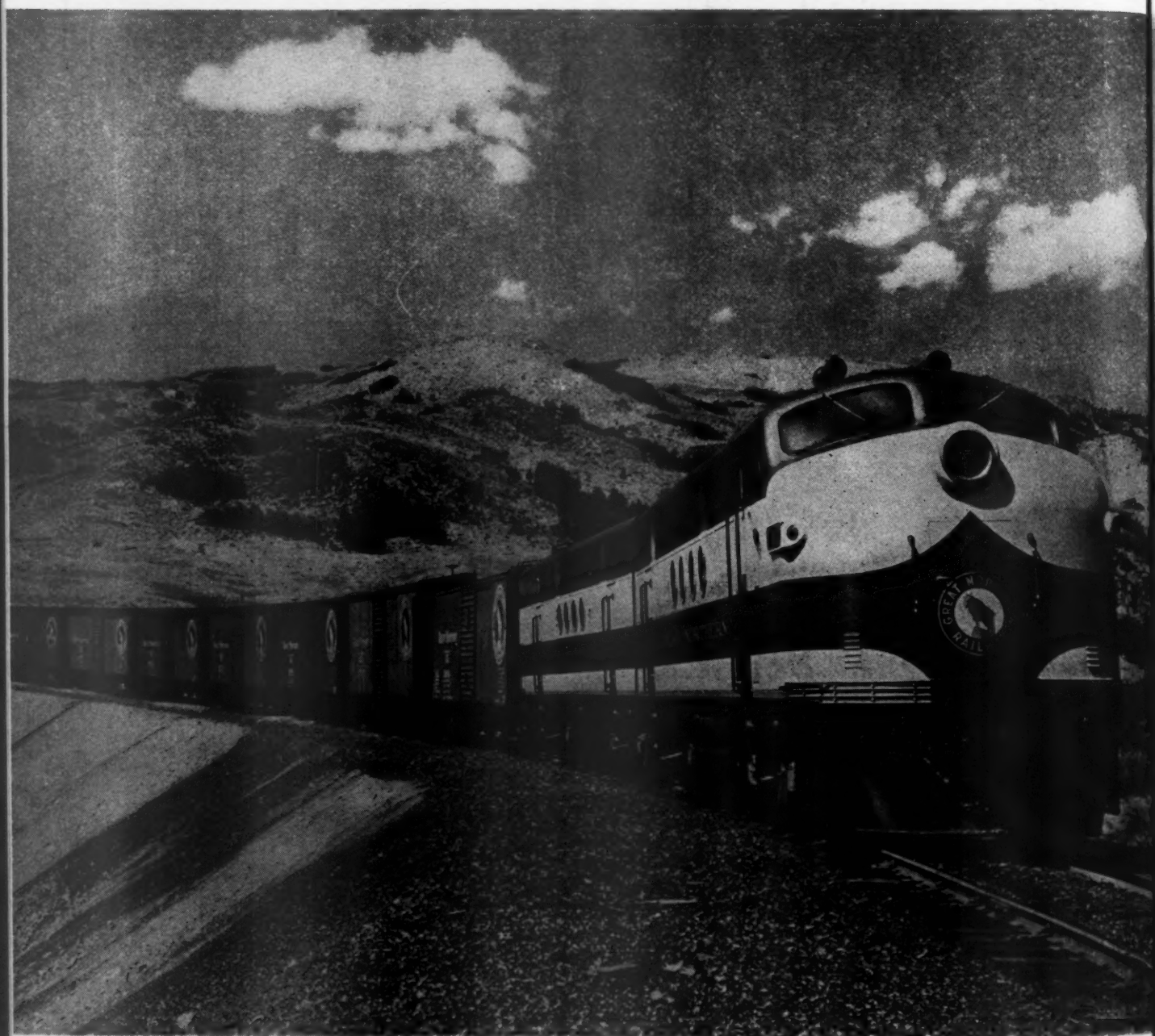
Superheaters • Superheater Pyrometers • Exhaust Steam Injectors • Steam Dryers • Feedwater Heaters • American Throttles

Record Performance over Historic Trails



THE Great Northern takes great pride in the fast, dependable freight service it provides between the Great Lakes, the Pacific northwest, and the Pacific ports.

And well it might, for this railroad has in operation one of the largest and finest fleets of General Motors Diesel freight locomotives in the United States. Throughout the entire system these General Motors Diesels are doing a great job — notably in the Great Northern's Rocky Mountain territory where powerful 5,400 H. P. Diesel locomotives haul heavy mile-long freights over mountainous terrain.

While the records these locomotives have set up are evidence of the effectiveness of Diesel power as General Motors builds it—they are no less a tribute to the good work of the Great Northern's maintenance organization.

Thirty General Motors Diesel freight locomotives operating on the Great Northern covered a total of 7,683,886 miles from May 1941, when the first locomotive was placed in service, through October 31, 1946. During this time, they attained an average of 9,545 miles' operation per locomotive per month with an average availability of 93.9%.

Following is a breakdown of performance for each locomotive:

Locomotive Number	Horsepower	Month Delivered	Miles Operated	Hours Assigned	Hours Worked	% Availability
250	2700	5-41	872,279	31,826	30,017	94.3
251	2700	6-41	702,660	30,237	28,833	95.4
252	2700	10-45	122,225	5,932	5,810	97.9
253	2700	10-41	735,728	30,221	28,636	94.8
254	2700	"A"—10-41				
		"B"—10-45	110,092	4,379	4,289	98.1
255	2700	"A"—10-41				
		"B"—10-45	109,170	4,435	4,366	98.4
256	2700	10-45	112,523	4,524	4,512	99.7
257	2700	11-45	104,181	4,846	4,837	99.8
258	2700	11-45	102,844	4,719	4,704	99.7
300	4050	"A"—10-45				
		"B"—10-41	306,387	43,729	42,116	96.3
		"C"—10-45				
301	4050	3-45	173,971	8,456	8,186	96.8
302	4050	3-45	175,189	8,361	8,221	98.3
303	4050	3-45	171,143	8,264	8,094	97.9
304	4050	3-45	170,090	8,137	8,009	98.4
305	4050	4-45	171,160	8,197	8,055	98.3
400	5400	12-43	257,538	19,376	17,998	92.9
402	5400	1-44	242,472	18,256	16,919	92.7
404	5400	1-44	290,051	15,759	14,565	92.4
406	5400	3-44	276,409	15,377	14,024	91.2
408	5400	3-44	273,967	15,037	13,899	92.4
410	5400	5-44	251,981	13,685	12,556	91.8
412	5400	6-44	244,499	13,642	12,379	90.7
414	5400	6-44	247,458	13,494	11,371	84.3
416	5400	6-44	245,017	13,380	12,168	90.9
418	5400	8-44	229,814	12,228	11,235	91.9
420	5400	9-44	216,287	11,309	10,502	92.9
422	5400	10-44	216,620	11,387	10,649	93.5
424	5400	10-44	214,261	11,299	10,501	92.9
426	5400	3-45	164,579	9,007	7,745	86.0
428	5400	3-45	173,291	8,824	8,147	92.3
		Total	7,683,886	408,314	383,343	93.9

ELECTRO-MOTIVE DIVISION

GENERAL MOTORS LA GRANGE, ILL.

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RAILROAD SHOP EQUIPMENT

WITH SPECIAL FORMING DIES AND PUNCHING TOOLS

No. 11-B HEAVY DUTY PUNCH offers exceptionally large die space, can be tooled to handle most complicated job in a single pass. Tooling of punch and spacing table always designed to the specific needs of the job to be done.

PRESS BRAKE AND FLANGER, combination 40-ton Flanger and 300-ton Press Brake handles any type of plate bending required in car and locomotive repairs — flanging, V-bending, forming, pressing and straightening.

CO-PUN-SHEAR provides a combination of Punching, Coping and Shearing tools assembled in working position, driven by a single motor and operated by independent clutches. Designed especially for car repair shops.

HYDRAULIC BULLDOZER designed to perform a wide range of forming, flanging and bending duties in railroad car shops.

Write for complete information on the BEATTY line of mechanical and hydraulic punches, presses, shears and spacing tables.

BEATTY

MACHINE & MFG. COMPANY

HAMMOND, INDIANA

159 (Adv. 70)

mechanical engineer of the American Arch Company. In 1913 he was elected vice-president in charge of engineering.

Personal Mention

General

ELMER A. KUHN, master mechanic of the Pere Marquette at Saginaw, Mich., has been appointed superintendent of motive power, with headquarters at Grand Rapids, Mich. Mr. Kuhn was born on May 2, 1897, and received his M. E. degree from the University of Pittsburgh in 1921. He entered railroad service as a machinist in the employ of the New York, Chicago & St. Louis on July 1, 1921. He was appointed assistant engineer motive power, Advisory Mechanical Committee, Chesapeake & Ohio, New York, Chicago & St. Louis, and Pere Marquette on December 1, 1929. He became master mechanic of the Pere Marquette at St. Thomas, Ont., on October 1, 1932, and was transferred to Saginaw January 1, 1937.

W. R. HARRISON, whose retirement as mechanical superintendent of the Atchison, Topeka & Santa Fe, with headquarters at Amarillo, Tex., was reported in the February issue, was born near Dardnelle, Ark., on September 4, 1881. On September 1, 1896, he became an apprentice in the employ of the Southern at Princeton, Ind., and served as a machinist on other railroads before he entered the service of the Santa Fe. He was appointed night enginehouse foreman in 1912, day enginehouse foreman in 1913; general foreman at Newton, Kan., on August 1, 1914; master mechanic at Chanute, Kan., on November 10, 1917; master mechanic at Argentine, Kan., on September 1, 1922; superintendent of shops at Albuquerque, N. M., on February 1, 1934, and mechanical superintendent at Amarillo on June 1, 1939.

PAUL O. CHRISTY has been appointed general superintendent of equipment of the Tennessee Central, with headquarters at Nashville, Tenn. Mr. Christy was born at Water Valley, Miss., on August 1, 1898. He entered railroad service in June, 1912, as a call boy in the employ of the Illinois Central. He later held different clerical positions and subsequently became a machinist apprentice. In 1925 he was appointed night enginehouse foreman; in 1930, general foreman; in 1937, assistant master mechanic; in 1938 master mechanic at Paducah, Ky., and in 1941, superintendent of equipment. Later in 1941 he became general superintendent of equipment for the entire Illinois Central System, with headquarters in Chicago. In June, 1945, he took leave of absence, and in September, 1946, returned to the railroad as mechanical inspector. He became general superintendent of equipment of the Tennessee Central on February 10.

G. A. HANNON, rule instructor of the Canadian National, at Winnipeg, Man., has been appointed assistant superintendent and master mechanic of the Smithers division with headquarters at Prince George, B. C.

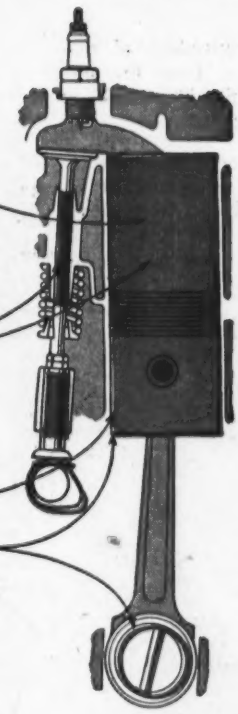
STANDARD ENGINEERS NOTEBOOK

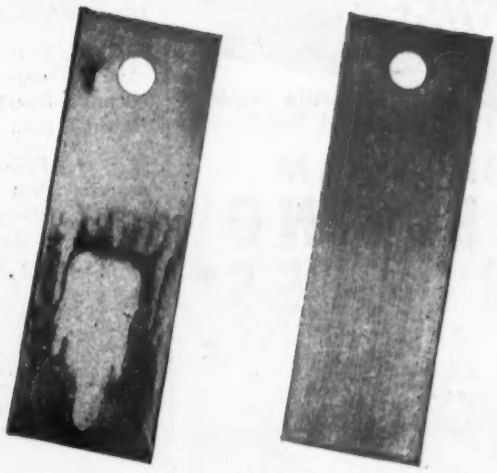
① Adhering agent in RPM Compounded Motor Oil keeps oil film on all parts after engine stops, even on cylinder walls.

② Rustproofing compounds prevent moisture that condenses on cooling parts from contacting metal.

③ No rust is formed to scrape off when engine starts, and cause excessive wear.

④ Constant lubricant film provides adequate and instant lubrication when engine starts.





This actual photograph shows how one HIGH-QUALITY MOTOR OIL "peeled" off almost all of this test strip of steel when it was placed in corrosive-moisture conditions similar to those in a cooling engine. The oil concentrated at one spot and the unprotected surface quickly rusted.

RPM COMPOUNDED MOTOR OIL kept this strip bright and shiny, completely sealed against rusting, when it was exposed to the same conditions. "RPM" compounds keep a constant rust-proofing lubricant film on engine parts at all times, whether they are idle or moving.

How RPM Motor Oil Rust-Proofs As It Lubricates

Rusting, caused by corrosive moisture, is the greatest source of wear in automotive engines (85%, according to some engineers). It can be controlled by using RPM Compounded Motor Oil.

Additional compounding for "RPM," perfected by Standard of California scientists, provides a rust-proofing lubricant film on internal engine surfaces. The heaviest moisture condensation in idle or cold-running engines will not cut through it.

Other compounds in RPM Motor Oil give it adherent qualities so the film stays on parts at all times. They also loosen and remove gum and lacquer, lubricate hot spots, resist sludge formation, bearing corrosion and stop foaming.

Trademark "RPM" Reg. U. S. Pat. Off.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

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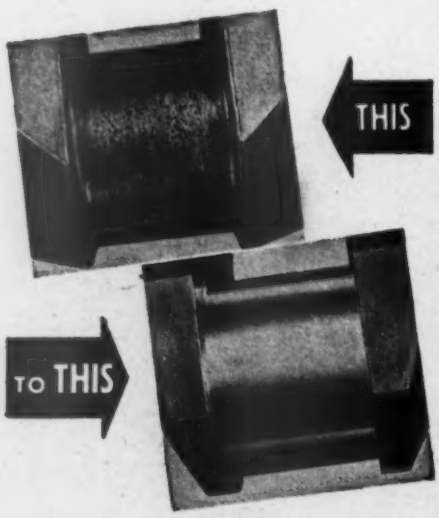
Don't SCRAP Crankshafts

RECLAIM THEM WITH THE . . .

BINGHAM SLEEVING PROCESS*



● You no longer need to commit all crankshafts to the scrap heap because journals are badly scored or burned. Many can be renewed to manufacturers' specifications by the new Bingham Sleeving Process. Saves *thousands* of dollars in motive power maintenance by prolonging crankshaft life. Let us send you the details.

For prices and literature, write today to Department RME-1

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DIESEL ENGINEERING COMPANY

Omaha 5, Nebraska

* Pat. Applied For

C. E. STEWART, master mechanic of the Northern Alberta at Edmonton, Alta., has been appointed superintendent of motive power and car equipment of the British Columbia district, with headquarters at Vancouver, B. C. Mr. Stewart was born at Detroit, Mich., and entered railroad service in 1906 as a machinist apprentice with the Canadian Northern, at Edmonton. After serving in the mechanical department of the Grand Trunk Pacific at various points, he was promoted to locomotive foreman in 1914. In 1919 he was appointed general foreman. In 1938 he was granted a leave of absence to become master mechanic of the Northern Alberta.

G. F. SCHULL, superintendent of machinery, with jurisdiction over the mechanical department, of the Clinchfield at Erwin, Tenn., has retired.

B. J. PEASLEY, whose retirement as superintendent of motive power of the St. Louis Southwestern of Texas, with headquarters at Tyler, Tex., was reported in the February issue, was born on December 21, 1867, at Terre Haute, Ill. He received his higher education at St. Viautus College, Kankakee, Ill., and business college at Burlington, Iowa. Mr. Peasley began his railroad career in 1883 as an apprentice machinist in the employ of the Chicago, Burlington & Quincy at Burlington, and subsequently held various minor positions with several roads. In 1908 he was appointed master mechanic of the Missouri Pacific at Ferriday, La., and in 1909, was transferred to De Soto, Mo. He was advanced to superintendent of shops at North Little Rock, Ark., in 1914, and joined the St. L. S. W. of Texas as mechanical superintendent at Tyler in 1917. The following year he became superintendent of motive power of the Vicksburg, Shreveport & Pacific (now part of the Illinois Central), at Monroe, La., and in 1920 was appointed superintendent of motive power of the Cotton Belt.

B. J. Peasley

ELMER V. MYERS, whose appointment as superintendent of motive power of the St. Louis Southwestern of Texas, at Tyler, Tex., was reported in the February issue, was born on February 2, 1897, at Whitney, Tex. He received his higher education through the International Correspondence Schools and an extension course of the University of Texas. Mr. Myers entered railway service in 1915 as a machinist ap-

A ROOF DOESN'T PREVENT RUST

Idle ferrous metal equipment in storehouse stocks earns no income . . . may even cause revenue-slashing expense, if it is exposed to the costly attack of rust. That is why maintenance engineers for many railroads always specify NO-RUST to protect storehouse stocks.

EASY TO APPLY . . . LONG-LASTING

Any exposed ferrous metal surface can be treated with the varnish-thin protective layer of NO-RUST in jig-time . . . at substantial saving in maintenance costs. Moreover, one application will last indefinitely.

NO-RUST is the safe, modern way to keep storehouse stocks ready for the road at all times. Cut upkeep costs on idle equipment. Specify NO-RUST for your shop.

We specialize in railroad protective finishes; GRAPAK front end paint . . . oil stain and car sealer . . . VERNIX floor hardener . . . freight car primer and finish.

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prentice in the employ of the Gulf, Colorado & Santa Fe (part of the Atchison, Topeka & Santa Fe), and from 1918 to 1920 was a

Elmer V. Myers

machinist. He subsequently held positions with several roads, joining the Cotton Belt as a machinist in 1923. He held various mechanical positions until August 11, 1936, when he was appointed night enginehouse foreman. In October of that year he became lead machinist. He was appointed erecting shop foreman in 1939; assistant general locomotive foreman in 1942, and general locomotive foreman in 1943.

JOHN CANNON has been appointed mechanical superintendent of the Pullman Company, with headquarters at Chicago. Mr. Cannon joined Pullman in 1913 as an electrician at Wilmington, Del., and later became an inspector. He was appointed

John Cannon

manager of the company's shops at Wilmington in 1936, and in 1942 was transferred to Chicago, where he became junior assistant mechanical superintendent. As mechanical superintendent, Mr. Cannon will direct the activities of Pullman's six major shops in Chicago, St. Louis, Mo., Buffalo, N. Y., Atlanta, Ga., Wilmington, Del., and Richmond, Calif.

A. J. HARTMAN, whose appointment as mechanical superintendent of the Atchison, Topeka & Santa Fe, with headquarters at Amarillo, Tex., was reported in the February issue, was born at Chicago on November 17, 1892. He entered railroad serv-

AIRETOOL TUBE CLEANERS mean fast, safe results

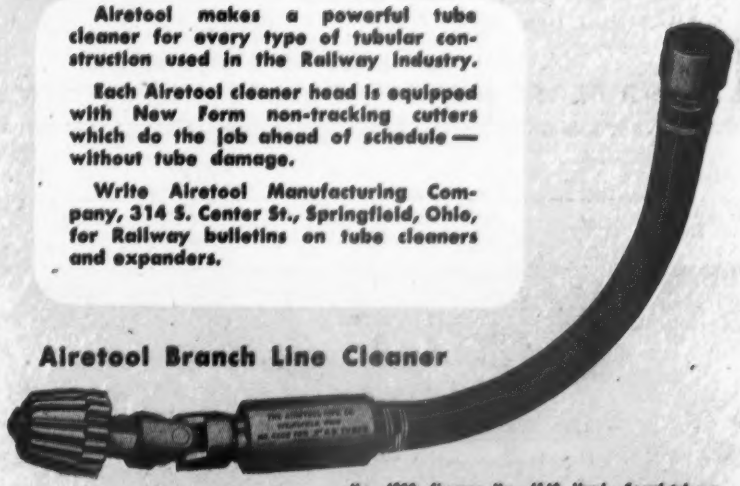
Airetool Arch Tube Cleaner

No. 4300 with expansion type head, P-8-B, for long sweep bends.

Airetool makes a powerful tube cleaner for every type of tubular construction used in the Railway industry.

Each Airetool cleaner head is equipped with New Form non-tracking cutters which do the job ahead of schedule — without tube damage.

Write Airetool Manufacturing Company, 314 S. Center St., Springfield, Ohio, for Railway bulletins on tube cleaners and expanders.



Airetool Branch Line Cleaner

No. 4200 Cleaner—No. 4140 Head. Completely removes all scale without taking down branch lines.

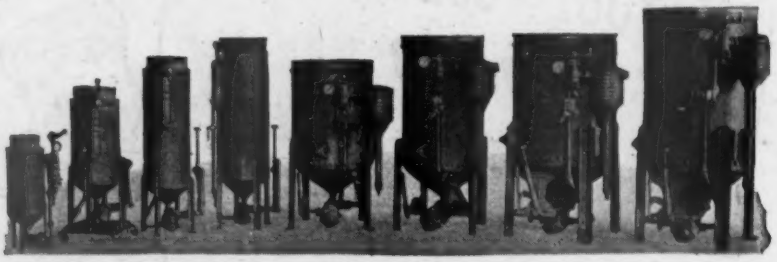
Airetool Cleaner for Nicholson Syphons

No. 4325 Cleaner—GE Head. This special cutter head will not catch on stay bolts—will not bulge syphon walls.

There is an Airetool Cleaner and Expander for every type of tubular construction.

AIRETOOL
MANUFACTURING COMPANY
SPRINGFIELD, OHIO

RUEMELIN GENERATORS
for Railroad Sand-Blast Jobs!



RUEMELIN Blast Generators are used by leading railroads for cleaning castings, freight cars, locomotives, tenders before re-painting; removing rust and scale from steam piping. Portable or stationary models. Sturdily built for trouble-free service. Easy to operate.

Wet adapting nozzle attachment available at moderate price.

Some of our users include—

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Missouri Pacific Railroad
Seaboard Air Line
Burlington Route

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MANUFACTURERS AND ENGINEERS
SAND BLAST and DUST COLLECTING EQUIPMENT

No Layout needed!

. . for punching, slotting and notching of plates

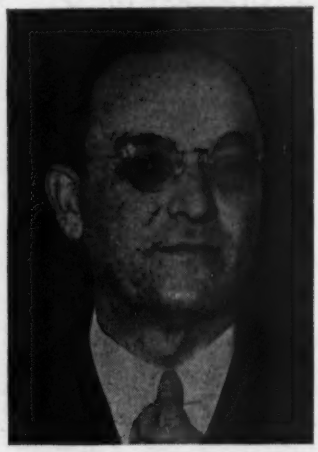
One-man Operation; Positive Control; Quick, Accurate Positioning

Where runs are too short to justify the use of a spacing table, or where irregular plates must be handled, this modern Thomas Duplicator is ideally adapted. It affords rapid, precision duplication of holes, notches or slots, and will speed production in car-shops, bus and truck building plants and in numerous other fabricating operations in varied industries.

Write for Bulletin 312

THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH 25, PA.

ice on May 13, 1910, as a boilermaker apprentice in the employ of the Gulf, Colorado



A. J. Hartman

& Santa Fe at Cleburne, Tex. He was successively, boilermaker, boilermaker apprentice instructor, night enginehouse foreman, machinist gang foreman, and general foreman until May 1, 1923, when he was appointed master mechanic at Newton, Kan. On December 1, 1945, Mr. Hartman was transferred to Albuquerque, N. M., where he served until his appointment as mechanical superintendent.

L. F. MUNSON has been appointed assistant mechanical superintendent of the Pullman Company, with headquarters at Chicago.

JOHN W. LEONARD has been appointed superintendent of passenger transportation of the Pennsylvania, with headquarters at Philadelphia, Pa. Mr. Leonard was born at Brooklyn, N. Y., on December 3, 1898, and attended Haverford (Pa.) School and Haverford College. After service with the U. S. Marine Corps during World War I, he served as timekeeper and office engineer with the Walter R. Cliffe Company, general contractors, at Philadelphia, and with the Dravo Contracting Company, Pittsburgh, Pa. He entered railroad service in 1923 as

John W. Leonard

a special apprentice for the Pennsylvania at Altoona, Pa., becoming motive-power inspector at Harrisburg, Pa., in 1926. In 1927 he was appointed gang foreman, Har-

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2 GAS MOTOR CARS

5 GAS-ELECTRIC MOTOR CARS

ALL HAVE

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- Hot Water Heating
- Westinghouse Air Brakes

GAS TYPE

Engine: Brill 6 cylinder 250 H.P.
Control: Double end
Fuel Capacity: 225 gal.
Seating Capacity: 1 car, 60 persons
1 car, 62 persons

GAS-ELECTRIC TYPE

One car has been used as trailer car, and has no motor equipment.

Engine: 3 cars 2 Winton 110, 350 H.P.; 1 car Brill, 250 H.P.
Control: Double end
Fuel Capacity: 3 cars 300 gal.; 1 car 225 gal.
Capacity: 4 cars 73 plus 6000 lbs. baggage
1 car 62, or 59 plus 6000 lbs. baggage

For Further Details and Inspection

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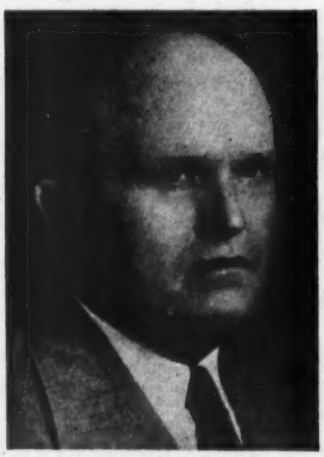
Formal bids should be submitted to Mr. Lamneck not later than April 15, 1947.

risburg enginehouse and in 1928 enginehouse foreman at Lancaster, Pa. He later served as assistant enginehouse foreman at Altoona and Camden, N. J., successively. In 1936 he was appointed assistant master mechanic at Harrisburg; in 1937, master mechanic at Camden and in 1938 assistant engineer motive power at Philadelphia. In 1939 he was transferred to Chicago as master mechanic and in 1940 became assistant superintendent freight transportation at Pittsburgh. Mr. Leonard was appointed superintendent of the Monongahela division at Pittsburgh later in 1940, and was transferred to the Erie and Ashtabula division at New Castle, Pa., in 1941; to the St. Louis division at Terre Haute, Ind., in 1943, and to the Eastern division at Pittsburgh in 1946.

ROBERT JAMES NEEDHAM, mechanical and electrical engineer of the Central region of the Canadian National at Toronto, Ont., has retired after many years of service.

R. W. ROGERS, assistant general manager of the Seaboard Air Line, has been appointed chief mechanical officer, with headquarters as before at Norfolk, Va. Mr. Rogers was born at Culloden, Ga.,



R. W. Rogers

on December 4, 1887. He entered railroad service on July 1, 1907, as a bookkeeper in the office of the auditor of the Atlanta & West Point. In March, 1908, he went with the Seaboard Air Line as file and voucher clerk at Abbeville, S. C., subsequently serving as roadway clerk at Monroe, N. C. In October, 1909, he became chief clerk to division engineer at Atlanta, Ga. in March, 1911, chief clerk to superintendent at Atlanta, and in March, 1924, trainmaster at Atlanta. He was appointed superintendent of the Georgia division at Atlanta in July, 1926, and was transferred to the North Carolina division at Hamlet, N. C., in September, 1934. In May, 1938, Mr. Rogers became assistant general manager at Savannah, Ga., and in June, 1939, assistant general manager at Norfolk.

DEAN F. WILLEY, assistant vice-president of the New York, New Haven & Hartford, has been appointed vice-president in charge of operating, maintenance and engineering, with headquarters at New Haven, Conn. Mr. Willey was born on August 5, 1896, at Manchester, N. H., and received his education at Manchester High School, Phillips Exeter Academy (1915), and the Massachusetts Institute of Technology

BRICKSEAL

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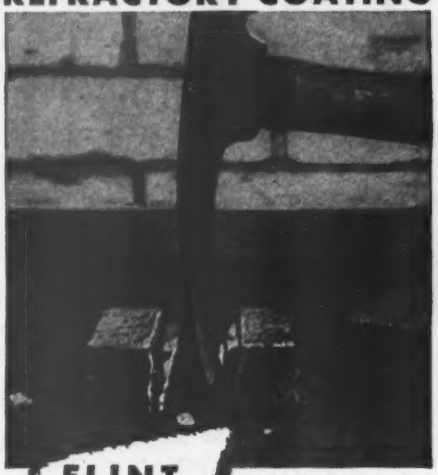

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DC

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Automatic Transportation Company of Chicago has announced that all of their new industrial trucks will be powered by DC Silicone insulated motors and lubricated with DC Silicone grease. That means a lot to us—and to you too. Engineers estimate that 20 to 50% of manufacturing costs goes into material handling. It costs you about $300, for example, to have a truck out of service while an armature is rewound.

Automatic Transportation is taking out insurance against such losses for you, by using Silicone insulation. That kind of insurance is really necessary because there is no control over the kind of service industrial trucks get. They may have to lift 1,500 or 35,000 pounds. They may be used constantly or only part time. They may run over smooth floors or rough ones. A 2% grade doubles the torque on the motors.

That's why Automatic uses the best insulation there is. They put the best grease they can buy in the bearings. That's the DC 44 silicone grease, because it won't bleed into the windings or brushes. They also cushion the solenoid coils with Silastic*. Taken altogether, it's a nice example of how a conscientious, enterprising company can improve its product by using Dow Corning Silicones. These heat-stable, water-proof materials are described in Catalog No. W 1-4.

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(1920). He entered the employ of the New Haven in June, 1920, as assistant engineer in the test department. On April 1, 1923, he was appointed general material supervisor; in October, 1923, mechanical inspector; in November, 1923, foreman mechanical inspector at Boston, Mass.; in July, 1924, acting general foreman; on November 1, 1924, general foreman; on September 16, 1925, assistant to superintendent

Dean F. Willey

of shops at Readville, Mass.; on May 16, 1930, special mechanical assistant at New Haven; in January, 1937, mechanical superintendent; in May, 1941, general mechanical superintendent; in November, 1944, assistant general manager, in charge of engineering, maintenance, and mechanical departments; and in June, 1946, assistant vice-president.

Master Mechanics and Road Foremen

D. BEATH has been appointed master mechanic of the Manitoba district of the Canadian Pacific.

ATCHISON, TOPEKA & SANTA FE.—The master mechanic's office of the Arizona division of the Atchison, Topeka & Santa Fe, which has been located at Needles, Calif., since 1902, has been transferred to Barstow, Calif.

W. J. HOLLOWAY, road foreman of engines of the Canadian Pacific, at Kenora, Ont., has been appointed division master mechanic, with headquarters at Edmonton, Alta.

H. E. LEHNHERR has been appointed assistant master mechanic of the Kansas City terminal division of the Missouri Pacific, with headquarters at Kansas City, Mo.

MAURICE H. LINGENFELTER, who has been appointed master mechanic of the Pennsylvania, with headquarters at Indianapolis, Ind., as announced in the January issue, was born on July 22, 1902, at Altoona, Pa. He is a graduate of Cornell University where he attained the degree of mechanical engineer in 1926. He entered the employ of the Pennsylvania on June 1, 1920, as a machinist apprentice. He became a special apprentice on August 5, 1925; motive-power inspector on August 24, 1928; gang foreman on September 2, 1928; assistant foreman on January 16, 1937; foreman at Hoboken, N. J., on March 16, 1939; supervisor floating equipment at Delmarva on April 1, 1940; assistant master mechanic at Erie, Pa., on April 16, 1942; assistant master mechanic, Pittsburgh division, on November 8, 1943, and master mechanic at Indianapolis on November 16, 1946.

E. J. LEMIEUX, master mechanic of the Canadian Pacific, with headquarters at Edmonton, Alta., has retired after 43 years of railroad service.

WILLIAM M. MARTIN, who has been appointed master mechanic of the Elgin, Joliet & Eastern at Gary, Ind., as noted in the January issue, was born on February 12, 1901, at Lafayette, Ind. He received his B.S. in mechanical engineering at Purdue University in 1924 and entered railroad service as a special apprentice in the employ of the New York Central on November 1, 1925. He became a special apprentice on November 1, 1925, and was promoted to the position of gang foreman at Elkhart, Ind., on November 1, 1928. From October, 1930, until August, 1933, Mr. Martin held various mechanical positions with the Chicago, Indianapolis & Louisville. He was then appointed assistant night enginehouse foreman at Bloomington, Ind., and in January, 1938, became night enginehouse foreman at Indianapolis, Ind.

W. M. Martin

From August, 1939, until October, 1942, he served in various positions in the research and mechanical standards department and as assistant master mechanic of the Union Pacific at Omaha, Neb. He entered military service in October, 1942, as a captain, serving as master mechanic and superintendent of equipment with Headquarters Third Military Railway Service in Iran and attaining the rank of Lieutenant Colonel. He was separated from the service in October, 1945, and on November 15 of that year was appointed general foreman of the Elgin, Joliet & Eastern at Gary. He became master mechanic on December 1, 1946.

J. AURELE POULIOT, who has been appointed road foreman of engines of the Canadian National at Parent, P. Q., as announced in the January issue, was born on February 14, 1898, at Fall River, Mass. He is a graduate of St. Patrice Business College, Riviere du Loup, P. Q. (June, 1914). He entered railway service on July 15, 1915, as a call boy in the employ

of the Intercolonial Railways at Riviere du Loup. He became a locomotive fireman at Bridge, Que., on January 11, 1916; locomotive engineer on January 11, 1918; road

J. A. Pouliot

foreman of engines on January 22, 1946; locomotive engineer on April 22, 1946, and road foreman of engines on November 16, 1946. Mr. Pouliot served with the 3rd C. E. R. B. during the first World War.

W. Stewart has been appointed master mechanic of the Saskatchewan district of the Canadian Pacific, with headquarters at Moose Jaw, Sask.

Electrical

W. D. Taylor has been appointed electrical engineer of the Central region of the Canadian National with headquarters at Toronto, Ont. Mr. Needham was born at London, Ont., in 1882 and received his B.S. degree from McGill University in 1910. He was foreman operator of the Detroit Edison Company from 1910 to 1911. In 1911 he became electrical engineer of the Grand Trunk, and in 1919 mechanical and electrical engineer for the same road and, later, the Canadian National.

Shop and Equipment

C. F. Hayes, motive-power inspector, Clifton Forge division, of the Chesapeake & Ohio, at Clifton Forge, Va., has retired.

E. W. Brackman, traveling fireman, has been appointed motive-power inspector, Clifton Forge division, of the Chesapeake & Ohio, at Clifton Forge, Va.

Obituary

Elwood McAfee Paradis, chief chemist of the West Albany laboratory of the New York Central system, died on January 31, at Albany General hospital, Albany, N. Y. Mr. Paradis was born at Stockton, Md., on April 19, 1889, and was a graduate of the Maryland State College in June, 1908, with a B.S. degree in chemistry. He was employed by the Pennsylvania from 1908 to 1913 as chemist and went with the New York Central system on August 1, 1913, as first assistant chemist at the Collinwood laboratory. He was appointed foreman of the chemical laboratory at Collinwood on June 1, 1916, and chief chemist at the West Albany laboratory on October 1, 1917.

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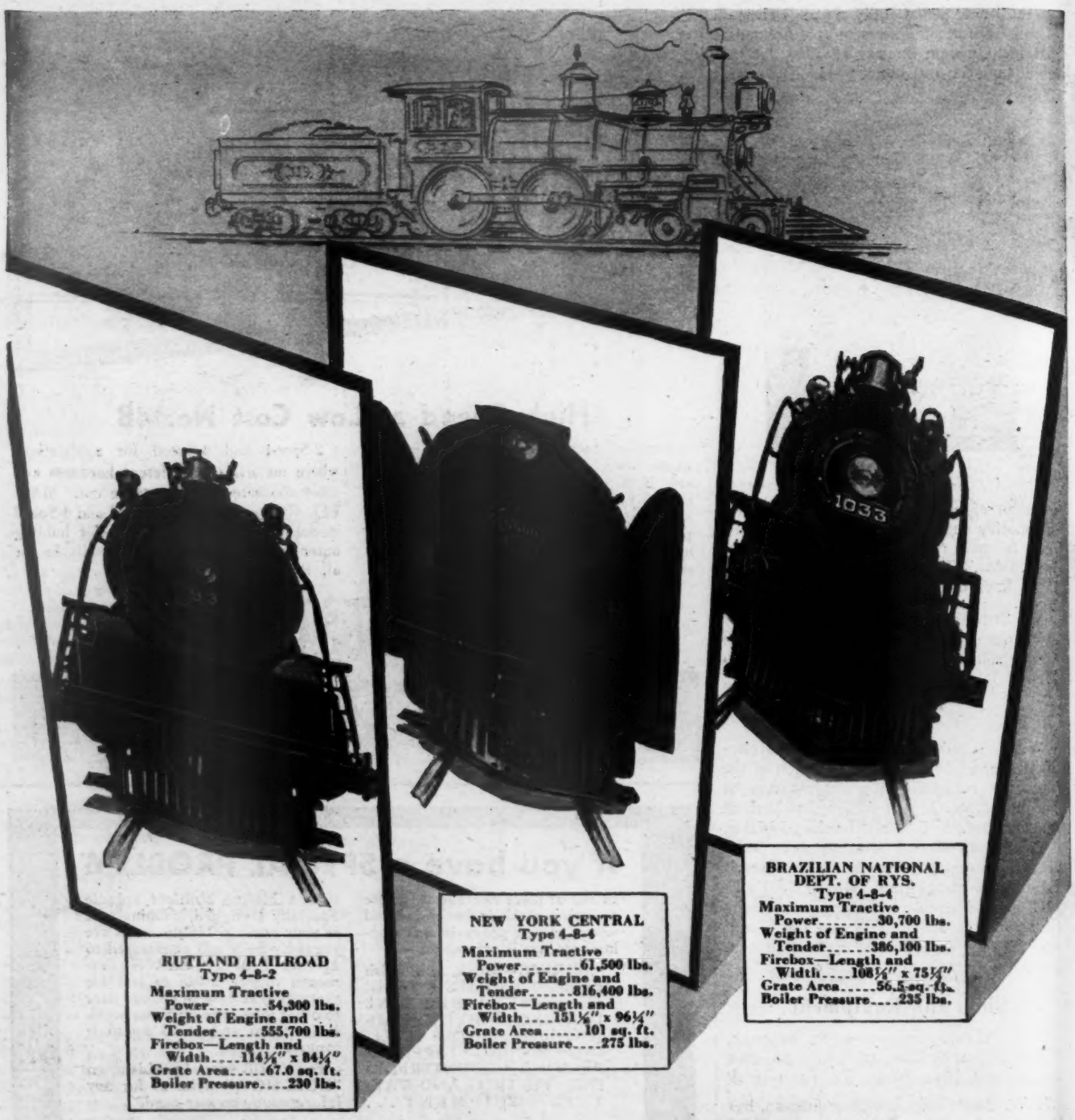

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